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Transportation

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Special Paratransit Service for Elderly and Handicapped Persons

Operational Experience

November 1981

Special Paratransit Service for Elderly and Handicapped Persons

Operational Experience

Final Report
November 1981

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I

FOREWORD

Section 16 of the Urban Mass Transportation Act of 1964, as amended, provides that "... special efforts shall be made in the planning ... of mass transportation facilities and services so that the availability to elderly and handicapped persons of mass transportation which they can effectively utilize will be assured". A number of actions have been taken by the Urban Mass Transportation Administration to implement this provision. Recently, these actions have focused on having local agencies determine the most effective way to meet these needs at the local level. In order to assist this process, the Office of Planning Assistance has conducted a study of special user transportation services in eighteen cities. The purpose of this study was to develop material which would be useful to local agencies in planning for the development or improvement of similar services in their areas.

This volume represents one of the key products of this study. It describes in some detail the results of the case studies conducted in terms of generalizable conclusions. We believe that this report will serve as a useful resource to those interested in the planning of efficient and effective special services for elderly and handicapped people.

Additional copies of this report are available from the National Technical Information Service (NTIS), Springfield, Virginia 22161. Please reference UMTA-CA-09-9003-81-1 on the request.

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ACKNOWLEDGEMENT

This Volume, one of three related documents, is the result of a major examination of U.S. paratransit systems by the Urban Mass Transportation Administration's Office of Planning Assistance. The project was directed by Richard Steinmann of that office.

This volume could not have been produced without enormous assistance and cooperation from transportation officials and community members in the 18 cities and counties examined:

-- Baton Rouge, Louisiana;
-- Boston, Massachusetts;
-- Broward County, Florida;
-- Columbus, Ohio;
-- Corpus Christi, Texas;
-- Des Moines, Iowa;
-- Houston, Texas;
-- Lincoln, Nebraska;
-- Lowell, Massachusetts;
-- Milwaukee, Wisconsin;
-- Orange County, California;
-- Phoenix, Arizona;
-- Portland, Maine;
-- Sacramento, California;
-- San Bernardino, California;
-- Syracuse, New York;
-- Tucson, Arizona, and
-- Tulsa, Oklahoma.

In addition, particular thanks are extended to Arthur Hollins for his assistance in the analysis underlying the document; to Eileen Koc and Patricia Cass of the Urban Mass Transportation Administration, for their assistance throughout the project and in reviewing the final document; and to Richard Steinmann, for his overall support and analytical contributions throughout the project.

Ned Einstein

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INTRODUCTION

BEGINNINGS

Since its introduction in the United States in 1971, dial-a-ride transportation has grown to represent a sizeable portion of many communities' public transportation systems, particularly where line haul service is sparse.

Dial-a-ride was designed as a means of extending public transportation to general transit riders in low density areas. The systems were designed to provide "door-to-door" (most were what is referred to today as "curb-to-curb") service on an immediate-response basis. But two major legislative thrusts at the Federal level quickly redirected dial-a-ride's course and future.

The first of these thrusts was the outpouring of funds to operate social service programs for elderly and low income persons. As most of these programs required the movement of clients to the facilities in order to use them, some of these funds were designated for use in providing transportation. As a consequence, U.S. cities are dotted with dozens (or in a few cases, hundreds) of tiny paratransit "systems" carrying the clients of a single social service agency to program facilities. As most of these programs conduct regularly-scheduled activities, most of these services are operated on a subscription basis (i.e., users make the same trips, at the same times, each day or week).

The second major thrust has been the growth of special programs for handicapped people which followed the passage of the Rehabilitation Act of 1973. The need to serve the clients of these programs led to an explosion of small, demand-responsive operations, as these clients' trip needs were not regularly-reoccuring.

The separate legislative thrusts for elderly and handicapped persons did much to reinforce an already stalwart resistance to coordination or consolidation of any kind among these systems. As a consequence, they saturate the service areas of communities throughout the U.S. while making a mere dent in the demand for such service among their combined constituencies.* Boston and Los Angeles each have more than 200 such operations.

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*The National Survey of the Transportation Handicapped found that "association vans" were being used by only one percent of the "transportation handicapped" (i.e., those persons unable to use regular line haul transportation all, most or some of the time).

The Federal Perspective

Because of its responsibilities and mission to meet the transportation needs of all persons, U.S. DOT has been involved in the growth of these two parallel trends (i.e., the spread of paratransit technology and the increase in programs for elderly and handicapped persons). U.S. DOT and UMTA launched major studies of the transportation needs of handicapped persons. More and more, it began to appear that special paratransit service would play an increasingly important role in transportation for these persons during the next decade.

In order to assist in this area, this study was initiated to develop technical guidance to local communities, to include a comprehensive body of knowledge with which they could begin to reshape their systems to better meet the transportation needs of all their citizens.

PROJECT DESIGN AND HISTORY

To address these goals, a data collection effort was designed to include a large enough sample of cities to allow for the extrapolation of general principles. Taking into consideration normal site selection criteria (e.g., range of city sizes, geographic representation), 18 cities were chosen. The result was the examination of 30 separate paratransit operations in these 18 communities.

In this examination, several broad questions had to be answered:

-- How are the systems composed and how do they operate?

-- Who uses the systems and how much service do they deliver to various user groups?

-- What portion of overall demand is being met?

-- What impacts have the services had on the communities in general?

-- How did the systems evolve into their present forms? What major forces (e.g., regulations, law suits) shaped system development, and how so?

-- How do the current systems perform both in terms of efficiency and effectiveness?

-- What special features of each system or community are worth sharing with other communities?

-- Who in each community is involved in planning, operating and monitoring the service, and what are their roles?

-- Does coordination of any kind exist?

-- What are the problems and issues with respect to paratransit service and specialized transportation services in general?

These broad questions were incorporated into extensive and detailed "casebooks" which guided Project Team members during site visits. The results were then compiled into a series of 18 uniformly-formatted case studies which were then used as the basis of an analysis of paratransit planning and operations in general.

PROJECT RESULTS AND PRODUCTS

This Project yielded a wealth of information about special paratransit operations and the problems of meeting E&H transportation needs in general. These results have been packaged into three distinct work products, available through UMTA:

(1) This document which contains the basic project findings. Chapters include:

I: Basic System Characteristics--An Overview;
II: History and Development;
III: Planning and Coordination;
IV: User and Community Impacts;
V: System Impacts (i.e., productivity);
VI: Problems;
VII: Issues, and
VIII: Unusual Features.

This volume presents the fundamental principles of paratransit planning and operations, overviews the state-of-the-art, and discusses relevant problems and issues. It also provides generalizations from the 18 communities examined about user impacts and productivity.

(2) A second document containing a model decision-making process for planning, designing, revising and operating special paratransit service. It presents 28 distinct decision-making areas, and describes the interrelationships between each decision and every other decision, identifying the most common feedback loops among them These 28 decision areas are structured from the broadest

the most detailed, placing first those choices which the Project Team felt would most drive other choices, and in so doing, allowing for the greatest number of critical choices to act as determinants, rather than victims of other system constraints, as is often the case now.

This second document contains, in addition, two detailed appendices, one summarizing all existing Federal programs for Elderly and Handicapped people, and the other overviewing and pricing the basic types of vehicles and equipment available.

(3) A set of 18 detailed case studies describing 30 major paratransit operations in the following 18 U.S. communities:

- Baton Rouge, Louisiana;
- Boston, Massachusetts;
- Broward County, Florida (including Ft. Lauderdale);
- Columbus, Ohio;
- Corpus Christi, Texas;
- Des Moines, Iowa;
- Houston, Texas;
- Lincoln, Nebraska;
- Lowell, Massachusetts;
- Milwaukee, Wisconsin;
- Orange County, California;
- Phoenix, Arizona;
- Portland, Maine;
- Sacramento, California;
- San Bernardino, California;
- Syracuse, New York;
- Tucson, Arizona, and
- Tulsa, Oklahoma.

Each case study is organized as follows:

--Chapter One: Basic System Characteristics--An overview of basic system features (fares, operating hours, fleet and service area size, funding sources, operating budget, etc.), the basic service concept (i.e., how the service area is broken up, how vehicles are deployed), and key community actors;

--Chapter Two: History and Development--A description of the transformation of the system(s) from its (their) early roots to the present forms, and a compendium of anticipated future changes;

- --Chapter Three: Administration and Planning--A description of planning, staffing and management functions surrounding operations, including funding, financing, monitoring and evaluation, certification, client referral, marketing and information dissemination, and coordination (of decision-making and service);

- --Chapter Four: Operations--A detailed description of how the system works, including: vehicles and deployment, labor, insurance, trip reservation procedures, scheduling, dispatching, fare collection and maintenance;

- --Chapter Five: Impacts--A detailed examination of the system's (or systems') impacts on users and potential users, the community at large and on itself (i.e., productivity), and

- --Chapter Six: Problems, Issues and Unusual Features--A discussion of the major problems and issues which have occurred in the communities, what their impacts have been, and what features of the system(s) are noteworthy.

These case studies were used as the basis for the analysis which led to the production of the other products described below.

DOCUMENT CONTENTS

The eight chapters included in this Volume answer the following broad questions:

- -- What have the communities accomplished? and

- -- What kinds of systems are now being operated, and what kinds of problems and issues have they encountered along the way?

The text attempts to synthesize the experiences of all 18 communities and 30 systems examined, and to draw from them the broad principles which apply to paratransit planning and operations in general.

Contents of the eight chapters are as follows:

Chapter I: Basic System Characteristics overviews, in broad terms, the 18 communities examined in the Project, organizing them by their most unifying characteristic: lead and operating agency pairings. The major relationships between lead and operating agency types and other factors are described briefly.

Chapter II: History and Development describes how paratransit systems evolved throughout the 1970s in the communities examined, focusing on common forms and patterns of system development; starting dates and milestones (e.g., Federal regulations) and their impacts on system planning and development; major forces of change (e.g., law suits, legislation, user group activism); key actors in the development process and their roles, and future trends.

Chapter III: Planning and Coordination describes what kind of planning occurred in the communities examined before the current systems appeared until the present day. The focus of this analysis lies on the planning process itself, major planning activities, the roles of various organizations and institutions in the process, and the impact of local, state and Federal regulations on planning. Finally, the Chapter overviews the state-of-the-art of coordination and its problems.

Chapter IV: User and Community Impacts describes actual and articulated demand for special paratransit service, the problems of meeting demand, how demand has been met by existing systems, major ride-limiting factors, and finally, impacts on non-users and the community at large.

Chapter V: System Impacts examines paratransit performance (or productivity) in great detail, focusing on the separate effects of various factors on efficiency, effectiveness and financial performance. Efforts are made to stratify the degree of impact for each specific factor on specific types of performance, in order to fully understand what indicator values actually reflect. Finally, some new ways of viewing paratransit performance are suggested and illustrated, which more truly capture the essence of paratransit's unique features.

Chapter VI: Problems presents an overview of 27 of the most influential problems confronting communities in their provision of special transportation. These are broken down into institutional problems, operational problems, and those problems which stem directly from the relationship between supply and demand.

Chapter VII: Issues examines in detail 13 major issues common to many communities, attempting to synthesize their main points and identify the factors which led to their emergence.

Chapter VIII: Unusual Features describes 25 unusual system or community features -- most found in only one instance -- which have had significant impacts on paratransit service where they occurred.

Finally, Appendix A contains a glossary of many of the most commonly-used terms which describe paratransit planning and operations.

The 30 systems examined in this Project are listed below, organized by community:

Community	System
Baton Rouge, La.	Special Transportation Service (STS)
Boston, Mass.	The RIDE
Broward County, Fla.	Social Service Transportation (SST) Handicab
Columbus, Ohio	Project Mainstream
Corpus Christi, Texas	Elderly and Handicapped Transportation Service (EHTS)
Des Moines, Iowa	Paratransit
Houston, Texas	METROLIFT
Lincoln, Neb.	Senior Handivan
Lowell, Mass.	Roadrunner
Milwaukee, Wisc.	user side subsidy program
Orange County, CA.	Dial-A-Lift Fun Bus Dial-A-Ride Yellow Cab Dial-A-Ride

Phoenix, Az.	Phoenix Dial-A-Ride
	Red Cross Dial-A-Ride
	Mesa Shared Ride Taxi
Portland, Maine	Regional Transportation Program (RTP)
Sacramento, CA.	Careful Coach
	Paratransit, Inc.
San Bernardino, CA.	Holy Deliverance Dial-A-Lift
	Holy Deliverance Dial-A-Ride
	Yellow-Checker Dial-A-Lift
	Yellow-Checker Dial-A-Ride
	Paul's Dial-A-Ride
	Paul's Dial-A-Lift
Syracuse, N.Y.	Call-A-Bus
Tucson, Az.	Special Needs Transportation Service (SNTS)
	Handi-Car
Tulsa, Okla.	Elderly and Handicapped Transportation Program (EHT)

CHAPTER I: BASIC SYSTEM CHARACTERISTICS

The most useful approach to classifying paratransit systems is one which best helps to explain paratransit as a whole, and one whose choices affect the shape of other system elements. The scheme which best fits this definition involves the choices of lead and operating agency. These two choices affect, or are affected by, choices made in every one of the other 27 decision areas identified in Volume II of this Manual.

Using this format, all paratransit systems may be classified into five broad types:

(1) Transit agency/authority serves as both lead and operating agency (Lincoln, Corpus Christi, Sacramento (two systems), Syracuse, Tulsa);

(2) Transit agency/authority serves as lead agency only (Boston, Columbus, Houston, Lowell, Milwaukee, Orange County (three systems), San Bernardino (six systems));

(3) City/county agency serves as lead and operating agency (Broward County (two systems), Phoenix Dial-A-Ride, Tucson (two systems, Portland);

(4) City/county agency serves as lead agency only (Des Moines/Phoenix-Mesa), and

(5) Social service agency serves as lead and operating agency (Baton Rouge, Phoenix Red Cross).

While there are really only three types of lead agencies --transit agency, social service agency, and city/county agency or corporation--there are many agency types that may function as operating agencies:

-- Transit agency;

-- City/County agency or corporation;

-- Private, for-profit van company;

-- Private, non-profit van company;

-- Taxi company, and

-- Social service agency.

Where transit agencies serve as operating agencies, they usually function as lead agencies as well. Des Moines, where a county agency serves as the lead agency, is an exception. And private, for-profit providers and taxi companies never serve as lead agencies.

Of the 27 system elements in which choices affect, or are affected by, the choice of lead and operating agency, the most important include:

-- Eligibility -- Because different agencies are eligible to receive different funds, systems tend to serve more agency-affiliated clients--commonly low income and/or elderly persons--when social service agencies or city/county agencies (other than the transit agency) function as the lead agency;

-- Service Area -- Certain operating agencies may have restrictions as to which areas they may operate in. Most common of these agency types are transit agencies and taxi companies;

-- Limits and Priorities -- Limits and priorities tend to favor agency-affiliated clients when social service agencies or city/county agencies (other than the transit agency) function as the lead agency;

-- Operating Hours -- Operating hours often correlate with the hours during which the operating agency is open. Thus, systems operated by transit agencies may find it easier to extend service to weekends or evenings, as the operating division is usually open then;

-- Fleet -- Private service providers and taxi companies are more apt to have spare vehicles (often unlimited) than other operating agency types. They often rotate vehicles within their general fleets, and special service vehicles often are the newest of the general fleet;

-- Labor -- Wage rates differ markedly by operating agency type. Transit agencies, when they employ union labor, pay considerably higher wages ($6.00 to $9.00) than non-union systems ($3.00 to $5.50);

-- Organizational Relationships -- These relationships, particularly financing and monitoring, are shaped largely by the combined choices of lead and operating agency, even though the nuances of those relationships may differ widely. The most obvious relation-

-- ship is the fact that the financing function does not exist when the same agency serves in both a lead and operating capacity;

-- Training -- Operating agencies which provide general service (i.e., transit agencies) come with drivers trained in driving skill, and sometimes, general first aid or CPR. Drivers of private, for-profit special service providers often are trained in special passenger handling as well, as they ordinarily carry a great number of elderly, and some handicapped persons. Taxi drivers and those of social service agencies tend to have the least training;

-- Maintenance -- Transit agencies have trained mechanics (although they often cannot fix gasoline-powered vehicles), and often they can work on evenings and weekends. Taxi companies which lease vehicles to their drivers, and large, private, for-profit special service providers also have maintenance facilities usable during evening (and sometimes weekend) hours, and their mechanics are always fluent in the repair of gasoline-powered vehicles, and

-- Funding -- Different lead agency types generally have access to different pots of money. Transit agency-run systems receive more Section 5 funds than do social service agency-run systems, or those run by city/county agencies. The latter types rely more commonly on HHS-funded programs as a primary source. Local, county or state funds seem to follow no pattern with respect to lead agencies.

Paratransit operations differ markedly from community to community, yet all share basic operating functions, performed somewhat differently, of course, in each case. Several characteristics of paratransit operations in particular help to describe paratransit operations from a user viewpoint:

-- Type of Service -- Service is provided on one of three bases: subscription (regularly occurring trips provided at regular internals), pre-scheduled demand-responsive and immediate-response. Most operations provide a mix of these types.

-- Trip Reservation Procedures -- Users must often call in advance to arrange for service, and are often granted immediate-response service only for special circumstances or when space is available and a vehicle nearby;

-- Certification -- Users normally must provide documentation for their eligibility, and a formal process provides them with identification, as well as establishing a means for the lead agency to monitor operations, and

-- Fare Collection -- Generally, users must surrender a fare on boarding, although it often covers only a fraction of the trip cost.

CHAPTER II: HISTORY AND DEVELOPMENT -- THE EVOLUTION OF SPECIAL PARATRANSIT SYSTEMS

Introduction

Jitney technology, which began operating in 1915, lasted only until 1920, when, with help from the transit industry, it was abruptly and convincingly wiped out. Posing as a direct challenge to the rigid dichotomy of turf between private line haul and taxi operations, jitney service was quickly swallowed up by the legal and regulatory realities of Post World War I America, although sanctions were somewhat relaxed during a brief period concurrent with World War II when automobile production ceased.

Paratransit of the 1970's did not make the same mistakes as its predecessor, and fortunately inherited a political, social and economic environment more conducive to its survival and growth. Bolstered by Federal regulations, increased demands for service by transportation-disadvantaged minorities (the old, handicapped people, the poor), impending energy shortages, and a growing recognition of the limitations of automobiles, buses and taxis to meet urban transportation needs, Dial-A-Ride has flourished, albeit slowly and with many problems.

To understand the current status of special paratransit systems, it is helpful to examine the development of such systems since their origins, since much of what exists today is the result of a combination of factors, many peculiar to each individual city. This Chapter will explore five aspects of the evolution of these systems:

- -- Common forms and patterns of system development;
- -- Starting dates and milestones, and their impacts on system development;
- -- Major forces of change;
- -- Key actors, and
- -- Future trends.

As Project site visits occurred from July, 1979 to January, 1980, efforts will be made to reconcile conclusions drawn from those visits with regulatory and policy changes and other realities which have occurred since then.

Common Forms and Patterns of System Development

The evolution of special paratransit systems has followed four basic patterns.

Integration of Existing and New Programs (Corpus Christi, Portland, Tucson). In this pattern, several small, uncoordinated (often agency-affiliated) programs were combined into a large one and run by new lead and operating agency combinations. Reasons for integration varied, including the financial collapse of existing programs (Corpus Christi), efforts to avoid a law suit from competing service providers (Tucson) and legislatively mandated consolidation (Portland). Except ih Portland's unusual case, the motive was unrelated to efficiency, effectiveness or any aspect of system improvement.

Transformation of Early Service Forms (Baton Rouge, Broward County, Des Moines, Houston, Lincoln, Lowell, Phoenix DAR, San Bernardino, Syracuse). Clearly the most common pattern, this form of evolution reflects both the high rate of failure encountered by early systems (Baton Rouge, Des Moines, Houston, Lowell, San Bernardino), due either to financial collapse (Baton Rouge, Lowell, Des Moines), institutional problems (San Bernardino) or lack of demand (Houston), the desire to expand service beyond the agency-affiliated, subscription service format of early operations (Phoenix DAR) or the desire to improve efficiency by transferring operations to a better qualified service provider (Broward County, Lincoln, Syracuse).

Continued Evolution of Original Service Type (Boston, Columbus, Milwaukee, Orange County, Phoenix Red Cross, Sacramento, Tulsa). Because of their youth, many systems of this type haven't had a chance to evolve. For example, Boston's contract operation will soon be subsumed by the transit operator--requiring its reclassification to the previous category. (It is important to remember that, from the perspective of late 1979, the average system life span was only between two and three years.) In other instances, however, systems have either endured despite numerous difficulties (Phoenix Red Cross), sprouted additions (Sacramento) or subdivided (Tulsa), while still retaining their original operating agencies.

Transformation of General Dial-A-Ride (Orange County, San Bernardino). This form of evolution is peculiar to a few cities, mostly in California and Arizona, which provide Dial-A-Ride service to the general public as a less expensive alternative to line haul service in low density areas. When the demand arose for special Dial-A-Ride service to the Elderly and Handicapped, these communities simply developed scale models of the existing Dial-A-Ride service they had been offering, and parcelled them out to the lowest bidder (Orange County) or to those providers already operating general Dial-A-Ride, and who, because of franchise restrictions, were the sole eligible providers for those jurisdictions (San Bernardino). It took Orange County three years and San Bernardino four years to make the transition from general Dial-A-Ride to combined Dial-A-Ride and Dial-A-Lift (for the Handicapped only) service.

Starting Dates and Milestones, and their Impacts on System Development

System Lifespans. Looking at system evolution from a late 1979 vantage point, the average lifespan of a system is between two and three years:*

Community	Start Date**	Months of Operation***	Different Forms Since Start	Months Per Form
Baton Rouge	1/78	21	3	7
Boston	4/77	30	1	30
Broward County	1/73	81	3	27
Columbus	8/78	13	1	13
Corpus Christi	1/74	69	2	35
Des Moines	1/77	33	2	17
Houston	8/76	37	3	12
Lincoln	6/72	87	1	87
Lowell	(6/75)****	50	2	25
Milwaukee	6/78	15	1	15
Orange County	6/75	50	2	25
Phoenix (DAR)	6/69	122	2	61
Portland	(6/73)****	86	2	43
Sacramento	3/76	42	2	21
San Bernardino	(6/74)****	66	3	22
Syracuse	9/72	84	1	84
Tucson	9/71	96	3	32
Tulsa	9/74	60	2	30

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*The vantage point is important here. Very likely, this life span will increase, as the experiences and failures of the first generation systems teach communities how to run better operations the second time around.

**This date is the actual or estimated (in parentheses) start date of the community's first special paratransit system, which, in most cases, is not the system described in detail in the case studies.

*** The outside date used was October, 1979, which was the mid-point date of Project site visits.

**** These are estimates of the author. In many cases, officials of present systems and other community spokespersons were unable to pin down exact start dates for early systems.

Lead and Operating Agency Patterns. There is also only one basic pattern, with respect to provider types, between first-to-second generation and second-to-third generation changes: the first switch generally transferred the operation to the transit agency. Otherwise, variations seem endless:

City	First Generation	Second Generation	Third Generation
Baton Rouge	L.A.:* social service agen. O.A.: social service agen.	transit operator transit operator	social service agen. social service agen.
Boston	L.A.: transit operator O.A.: pvt. for-profit	(transit operator)** (transit operator)**	- -
Broward County	L.A.: social service agen. O.A.: pvt. non-profit	pvt. transit operator pvt. transit operator	County agency County agency
Columbus	L.A.: transit operator O.A.: pvt. non-profit	- -	- -
Corpus Christi	L.A.: social service agens. O.A.: social service agens.	transit operator transit operator	- -
Des Moines	L.A.: local government O.A.: pvt. non-profit	county government transit operator	- -
Houston	L.A.: transit operator O.A.: transit operator	taxi company taxi company	transit operator misc. providers
Lincoln	L.A.: transit operator O.A.: transit operator	- -	- -
Lowell	L.A.: social service agen. O.A.: social service agen.	transit authority pvt. for-profit	- -
Milwaukee	L.A.: transit operator O.A.: taxis, pvt. for-profits	- -	- -
Orange County	L.A.: transit operator O.A.: pvt. for-profits	- -	- -
Phoenix (DAR)	L.A.: social service agen. O.A.: social service agen.	city agency city agency	- -
Portland	L.A.: social service agens. O.A.: social service agens.	city corporation city corporation	- -
Sacramento	L.A.: transit operator O.A.: transit operator	transit operator trans. oper., pvt. f.p.	- -
San Bernardino	L.A.: transit operator O.A.: pvt. for- & non-profits	transit operator pvt. for- & non-profits	- -
Syracuse	L.A.: transit operator O.A.: transit operator	- -	- -
Tucson	L.A.: soc. ser., city O.A.: soc. ser., pvt. v.p.	city agency city agency	city agency city agen., pvt. f.p.
Tulsa	L.A.: transit operator O.A.: tran. oper, soc. ser.	transit operator transit operator	- -

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*L.A. stands for lead agency, O.A. for operating agency

**This is expected to happen late in 1980.

BEST DOCUMENT AVAILABLE

The logic in the above pattern seems obvious and persistent: if you can't run a good system, give it to the transit agency. As often as not, given a couple years' time, the transit agency will pass it on to someone else (Baton Rouge, Broward County, Houston) or get some help (Sacramento). And when neither the transit agency nor the next generation provider can operate it, they may pass it on to still other providers, remaining as lead and sub-lead agencies, respectively (Houston). In only five instances was the first generation system able to remain intact (Columbus, Lincoln, Milwaukee, Syracuse, Boston)--all cases where the transit agency was and is the lead agency. Communities with first generation systems still operating (5) were rarer than those which have experienced two generations (8), and equally as abundant as those which have had three (5). (The average, for what it's worth, is, thus, two.)

Life Spans, by System Generation. Also interesting is the life span of each successive system generation:*

City	Months 1st generation	Months 2nd generation	Months 3rd generation
Baton Rouge	14	39	21+
Boston	30+	-	-
Broward County	18	18	45+
Columbus	14+	-	-
Corpus Christi	55	14+	-
Des Moines	24	21+	-
Houston	12	18**	-
Lincoln	93+	-	-
Lowell	(30)***	21+	-
Milwaukee	15+	-	-
Orange County	45	36+	-
Phoenix (DAR)	96	30+	-
Portland	(30)***	45+	-
Sacramento	24	15+	-
San Bernardino	(52)	8	6+
Syracuse	96+	-	-
Tucson	18	75	3+
Tulsa	3	60+	

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*October, 1979 is the end-point of this scale.

**Changed operators mid-stream.

***This figure is only a Project Team guess. Site officials did not know the exact start date of this version of service.

The average lifespan of a system generation, as of October, 1979, was 30.7 months, whereas the lifespan of a first generation system was 36 months (counting all first generation systems, including those still operating intact). Second generation lifespans, as of October, 1979, averaged 30.8 months, counting only those which subsequently evolved further. In even such a small sample, with such wide variation from the norms, it is striking how close the average lifespans of each generation are to the aggregate lifespans of all generations of systems.

Much greater differences appear in the average lifespans of systems, by major lead and operating agency type:

-- transit agency as operating agency*. . . 41.9 months;

-- transit agency as lead agency only . . . 19.4 months;

-- social service agency as lead and operating agency . . . . 37.7 months;

-- public agency or corporation as lead and operating agency . . . . 48.8 months, and

-- transit agency or city agency as lead and operating agency, supported by major provider(s) . . . . 9 months.

Yet, there are qualifying factors in every case:

-- Transit agency as operating agency (41.9) -- This form is still intact in four of the eight cases considered; thus, this average life span is likely to be much higher since the site visits occurred;

-- Transit agency as lead agency only (19.4) -- This number will probably increase, as only Boston's situation is expected to change in the near future;

-- Social service agency as lead and operating agency (37.7) -- This number will probably remain pretty much the same, as most of these are first generation systems that no longer exist. The number is large to begin with, because many of these were primitive systems which began on a subscription-only basis when or before dial-a-ride began appearing in the U.S.;

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*The transit agency usually serves as the lead agency as well, with only one exception: Des Moines.

-- Public agency or corporation as lead or operating agency (48.8) -- The longest of these (Tucson) no longer exists (although that public agency still operates, but in conjunction with another provider). But the other three are still intact. These service types generally have the broadest funding bases (particularly Broward County and Portland), and thus, it is likely that this number has grown since the site visits, and

-- Transit agency or city agency as lead and operating agency supplemented by another operating agency (9) -- While this lifespan is short, both examples (Sacramento and Tucson) are second and third generation systems, respectively, and still intact. This number will grow.

With respect to this quantative presentation, one must be careful not to place too much value on numbers, exactly half of which represent systems still running. In addition, first generation system origins range from 1969 to 1978, a spectrum which would be expected to have some effect on these numbers. And, at the time of this writing (July 1980), 17 of the final 18 generations described herein are still operating under the same arrangement as during the site visits (the site visit mid-point was October 1979). Yet the numbers do make the basic point that the average community's central paratransit system has undergone an average of one major transformation since it began operating.

Lead Time from Planning to Implementation. Another interesting facet of system growth is the amount of time it took each community to actually begin operating its first generation system since the decision was made to do so:*

-- Baton Rouge	6 months;
-- Boston.	(30) months;
-- Broward County	N. A.;**
-- Columbus.	(48) months;
-- Corpus Christi	(24) months;
-- Des Moines.	(39) months;

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* Figures in brackets are estimates; most are accurate within three months;

** Some first generation systems began as small, agency-affiliated programs in the early 1970's. Exact dates of the commencement of planning were hard to determine.

-- Houston . . . . (18) months;

-- Lincoln . . . . (12) months;

-- Lowell . . . . N.A.;*

-- Milwaukee . . . . 30 months;

-- Orange County . . . . (54) months;**

-- Phoenix . . . . N.A.;*

-- Portland. . . . . N.A.;*

-- Sacramento. . . . . (3) months;

-- San Bernardino. . . . . (36) months;**

-- Syracuse. . . . . N.A.; *

-- Tucson . . . . N.A., * and

-- Tulsa . . . . (6) months.

While the exact date of the "go ahead" decision to either conduct a formal planning study or to begin system design is hard to pin down, it is clear even from the estimates shown above that system implementation for most first generation systems took almost as long (25.5 months, on the average) as those systems lasted once they were in place and running (36 or 29.5 months, depending upon the definition of first generation systems used). The more formal the planning process, the longer the implementation period (Columbus, Des Moines, Orange County, San Bernardino). Much of this turnaround time may also be explained by the fact that at the time of these systems' emergence, no state-of-the-art existed for designing or operating them, and there were virtually no statutory or regulatory pressures in effect to encourage community officials to do so. In contrast, most "quick" turnaround times represent small, often one-vehicle operations (Phoenix, Broward County, Tulsa) or a date coinciding with the April, 1976 regulations (Sacramento).

Common System Elements. Regardless of a system's evolutionary form or lead and operating agency combination, several important elements and patterns were more or less common to the evolution of all systems:

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* Some first generation systems began as small, agency-affiliated programs in the early 1970's. Exact dates of the commencement of planning were hard to determine.

** During this period, general Dial-A-Ride was available.

-- Fleet Size -- Most systems, particularly early first generation systems (those begun before 1974), began operating with very few vehicles, often only one. With such a fleet, the notion of a service concept was irrelevant. As these systems grew in a piecemeal fashion through vehicle acquisition, the existing operating agency structure became increasingly inappropriate. This led, quite often, to a decision to formally change the system;

-- Type of Service -- Tied as they were to rigid funding restraints, the majority of early systems operated on a subscription-only basis, often serving the clients of a single social service agency. Because of the almost "fixed route" nature of this service, many operating functions and characteristics common to more elaborate systems (dispatching, pre-scheduling, demand-responsive service, etc.) did not develop. When the performance of such functions was deemed necessary, the community often had to find another operating agency which could handle them. This fact helps to explain why so many second generation systems are run by transit agencies;

-- Eligibility -- Also because of their ties to early funding programs, the majority of early systems served primarily elderly and/or low income persons. The legislative push to serve handicapped persons -- a decision inevitably requiring the inclusion of demand-responsive in addition to subscription service--also led to a change in operating agencies in many cities;

-- Lead and Operating Agencies -- Social service agencies were involved, in a lead or operating agency capacity, in eight of the first generation systems operated in the 18 communities examined. None of those systems have remained intact, whereas all four of the first generation systems operating intact today involved the transit agency in either the lead or operating role, and sometimes both. The tendency to split lead and operating responsibilities between two agencies appears not to have changed much as systems evolved. About half the cases in each generation are of this split-responsibility variety;

-- Fares -- Many first generation systems charged no fares, as social service programs forbid doing so;

-- Operating Hours -- Many first generation systems, particularly those of the early 1970's, operated only during the weekday hours, reflecting limited resources, limited expertise in variable deployment and/or little recognition of user trip needs, and

-- Level Changes -- Most early systems were curb-to-curb rather than door-to-door. This is explainable primarily by the fact that the basic user groups were elderly and low income rather than handicapped persons.

Impacts of Start Dates on System Structure and Service Provision. It should be apparent at this point that when a system began had much to do with both what kind of service it provided and what institutions and structures governed decision-making. Of all dates and events, the April 30, 1976 "Special Efforts" regulations had, by far, the most profound and far-reaching impacts on service provision and structure.

Before April, 1976, local communities were under no clear mandate to provide service to handicapped persons. Funding programs for elderly and low income persons existed in abundance, whereas service to handicapped persons would have meant, in most cases, a sizeable commitment of local funds. As a result, service to handicapped persons was extended early, or in first generation systems, in communities with strong vocal coalitions of handicapped persons (Tucson, Syracuse, Boston, Columbus), often where they engaged in lawsuits (Milwaukee, Orange County) or where the community itself was strongly committed to service to handicapped persons in a broad sense (Lincoln, Tulsa). Those with strong coalitions of elderly persons (Baton Rouge, Broward County, Phoenix) began providing early service only to elderly persons.

Perhaps the most important evidence of the importance which the "Special Efforts" regulations had on service provision is reflected by eligibility patterns of those systems begun before as opposed to after April, 1976. Of the nine communities which began major (often second generation) operations prior to April, 1976, non-handicapped elderly persons were eligible for all of them. Yet, of the nine major systems begun after April, 1976, non-handicapped elderly persons were eligible for service on only three. (More will be said about these regulations in the subsequent chapter.)*

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*There are other factors to consider which affected these eligibility patterns as well (see Chapter III: PLANNING AND COORDINATION).

Major Forces of Change

Paratransit systems hardly evolved in a constraint-free environment. Numerous political, economic, jurisdictional and legal forces shaped their development, and many of these forces were not directly related to either paratransit service or their potential users.

Federal and State Regulations. Regulations have had profound impacts on both planning and operations (see Chapter III: PLANNING AND COORDINATION for a detailed discussion of major Federal regulations). Unfortunately, regulations have brought about as many problems as they have solved. The reason for this can be found in the powerful, unavoidable interrelationships among the numerous system variables, and the fact that regulations rarely have taken these interrelationships into consideration. Thus, in San Bernardino, 16 of 20 members of a brokerage program dropped out because they could not meet state-mandated minimum requirements for insurance coverage. Three additional providers dropped out when Section 15 FARE Reporting Requirements were imposed on them. Vehicle-sharing coordination agreements were disbanded when a State Senate Bill (SB 620) required all special paratransit systems to obtain 10 percent of their operating costs from the farebox; this ratio could only be met by shifting operating costs to capital costs, each system obtaining its own separate vehicles in the process. And demand-responsive service was held up for 10 months while the operating agency obtained a radio license from the Federal Communications Commission.

All communities have not been hit as hard as San Bernardino, or as those, in general, in California, largely because state legislatures have not become heavily involved in the field in most states. On the other hand, a few state regulations have had positive impacts, such as the State of Maine's mandating regional consolidation of all special paratransit systems.* Overall, regulations have tended to have their most dramatic direct effects on the following system parameters:**

-- planning (Federal);
-- funding (Federal and state);
-- eligibility (Federal);

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*California has a similar legislative mandate, but the State Department of Transportation has not had similar success in translating this mandate into the consolidation it outlines.

**Volume II of this Manual will examine the impacts of particular regulations on these specific items in detail.

-- trip purpose prioritization (Federal);
-- insurance (State);
-- service area (local);
-- provider costs (local);
-- client referral (Federal);
-- monitoring (Federal);
-- coordination (Federal and State);
-- fares (Federal);
-- equipment (Federal and State), and
-- vehicles (Federal and State).

Perhaps more interesting are those system parameters which have remained largely unaffected (directly) by regulations:

-- administration;
-- staffing;
-- wage rates;
-- work rules;
-- level changes;
-- type of service (i.e., demand-responsive versus subscription);
-- selection of lead agency;
-- selection of operating agency;
-- service concept;
-- deployment;
-- operating hours;
-- marketing;
-- maintenance;
-- scheduling;
-- dispatching;
-- trip reservation procedures, and
-- financing.

The appearance of these system parameters in two lists seems completely arbitrary in a systems sense--although the regulatory package as a whole was not designed to bring about any broad system results. For that reason, taken together, they have had only mildly positive impacts on effectiveness, mildly negative impacts on efficiency, and--except in California--no impacts on financial performance (see Chapter V: SYSTEM IMPACTS).* Ironically, some areas have seen no impact because regulations were simply ignored.

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*Regulations which increasingly required service to shift more toward handicapped persons had, over the long run, negative impacts on financial performance, as it costs more to transport handicapped persons than elderly ones.

Public Takeovers of Transit Systems. Because most public takeovers occurred before 1975 or so, those few communities which experienced takeovers after that point were naturally behind the norm in most aspects of transportation system development. Special paratransit was no exception. So, when the public takeovers in Milwaukee (1975) and San Bernardino (1976), and the formation of a regional transit authority in Lowell (1976) coincided with the "Special Efforts" requirements of the April, 1976 regulations, all three communities were forced to focus their immediate attention on the re-development of line haul service. As a result, special transportation service did not begin until 1978 in all three of these communities.

Group Activism. The pressure brought on system and community officials by elderly and handicapped individuals and advocacy groups differed from community to community, and varied from law suits (Milwaukee, Orange County) to total acquiescence (Tucson). In general, pressure mounted during the 1970's in response to Federal legislation, milestones being the Rehabilitation Act of 1973, the April, 1976 regulations and the first proposed Transbus Mandate (initially rejected as infeasible by Secretary Coleman in 1976). In many communities in the early 1970's, elderly people were active, and often helped to generate planning studies (Corpus Christi, Orange County, San Bernardino, Tulsa) or actual service (Baton Rouge, Broward County, Houston, Lincoln, Syracuse). As legislative emphasis began to shift toward handicapped persons, advocacy groups made up of these people grew in power, demanding special service where none had existed (Boston, Milwaukee, Lowell, Des Moines, Columbus) and demanding inclusion in the system where it had previously served only low income or elderly persons (Broward County, Corpus Christi, Lincoln, Phoenix, Portland, Tucson) or the general public (San Bernardino, Orange County).

Lawsuits by Handicapped People. During the 1970's, 21 major lawsuits have been brought by advocacy groups for handicapped persons, and individuals, against local governments, transit agencies and/or U.S. DOT/UMTA. Most of these suits were designed to effect full line haul accessibility, although in a few cases the plaintiffs demanded comparable supplementary service in addition. While none of these suits resulted directly in the retrofitting of existing line haul systems, in many cases preliminary injunctions were granted which effectively halted the development of transportation in the communities involved until commitments acceptable to the plaintiffs were made. The majority of cases were either settled out of court or with the court's assistance, or were rendered moot by Secretary Adams' reaffirmation of the Transbus Mandate in September, 1977.

Lawsuits had far-reaching effects in two of the communities examined in this Project: Milwaukee and Orange County.

In Milwaukee, the suit was settled by Milwaukee County's agreement to undertake a major study of the transportation needs of handicapped people and alternatives for service. The study recommended a combination of fully accessible buses, a user side subsidy paratransit program and the coordination of existing special paratransit services. Implementation of all three programs has begun, and Milwaukee's transit system is expected to be fully accessible by July, 1982. This suit may have led to a $1,000,000 state grant (requiring a 10% local match) for special services, $225,000 of which went to Milwaukee in FY 1979.

The handicapped community in Orange County brought an almost identical suit, also in 1975. Here, however, many studies had already been completed (many served as a basis for the lawsuit), so the County had to respond by immediately providing service. As Orange County's line haul transit fleet was almost brand new, the County opted to redesign its existing paratransit system (a mixed mode system involving small bus fixed route and demand-responsive service) to provide better service to handicapped people.* The result was the design and implementation of a separate, County-wide Dial-A-Lift system for the exclusive use of these persons, and the redesign and staging of a general Dial-A-Ride system, to be used by elderly persons only, during mid-day, off-peak hours.

Local Government Pressure. Despite the widespread activism of groups of elderly and handicapped persons and the changing thrust of Federal legislation, a surprisingly small amount of local government effort has been made in the area of special transportation. In the few communities where it has occurred (Lincoln, Milwaukee, Lowell, Broward County, Phoenix), it has made a significant difference.

The best example of strong local government effort is Lincoln, where the mayor's personal interest in service to handicapped persons led to the formation of one of the nation's first special, all-purpose transportation systems for handicapped people (1972). Much of the system's success (remember: this system began operating before the Rehabilitation Act of

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*Another major event which coincided with this decision was a lawsuit by existing service providers which challenged the Transit District's right to operate mixed-mode service in jurisdictions where they had franchise rights to similar service.

1973 was passed) lay in the fact that it was only one element in a broad-based, community-wide accessibility program. This program included the gradual construction of thousands of curb cuts and the development of a financial package to pay the costs of constructing a ramp from a handicapped person's porch to the sidewalk. Two major advocacy groups with strong ties to the Mayor's Office -- the Lincoln Information Service for the Elderly (LIFE) and the League of Human Dignity (for handicapped people) -- are so active in the community's service (LIFE performs certification, client referral, marketing and outreach, and grievance resolution) that they almost resemble a lead agency.

Funding Availability and Constraints. Particularly at the outset, paratransit service has been shaped very much by the availability of funds and constraints associated with funding programs. The greatest impacts have been on fleet size and eligibility.

A great many early systems (i.e., those established before 1975) began with only a single vehicle (Phoenix Dial-A-Ride, Phoenix-Mesa, Syracuse, Tulsa) and grew in piecemeal fashion as vehicles were added. The acquisition and operation of a vehicle implies a driver, maintenance, administration and other functions. Funds for the performance of these functions rarely were obtained at the same time, and of the appropriate amount, as the vehicles. As a result, most systems were somewhat out of synchronization throughout their early years, as they either had inadequate operating funds to deploy available vehicles or a shortage of vehicles.

Few programs which provided operating funds allowed them to be used for elderly and handicapped persons of a community's choice. Rather, in most cases, funds were made available to carry specific types of persons and/or for specific trip purposes (e.g., Title XX funds could be used only to transport low income persons to nutrition programs). Thus, until a community was able to broaden its funding base, the flexibility to establish eligibility standards compatible with community goals did not exist. A rare few cities maintained complete control over eligibility criteria by funding the service entirely with state, local and/or Section 5 funds (Columbus, Milwaukee, Lowell, Phoenix-Mesa, Orange County, San Bernardino, Tucson).

It is almost a law of nature in transportation that the extension of service is irreversible. Thus, as funding sources dried up and systems were forced to seek other means of support, the eligible client groups covered by various funding packages changed, often eliminating those who had been using the service and replacing them with newly-eligible riders. Most often, this shift consisted of the substitution of handicapped for elderly persons, mirroring the parallel growth of programs for handicapped people, and increasing outspokenness of handicapped individuals and advocacy groups after passage of the Rehabilitation Act of 1973. As the non-handicapped Elderly saw their service usurped by handicapped persons, issues flared (Broward County, Corpus Christi, Houston, Lincoln).

These circumstances were exacerbated by time limitations on a few programs. The Phoenix Red Cross service was hit particularly hard in this way because it depended almost entirely on Area Agency for the Aging (AAA) funds, which have a three-year life span. Were it not for emergency stipends, the Program would have collapsed on several occasions. To make matters worse, paratransit vehicles rarely last longer than three years in good working order, and thus, after three years, most vehicles acquired must be used for replacement rather than for expansion. Thus, eligibility may shrink as a result of program changes, but it rarely expands after the third year.

The fact that a system's growth may have an outside limit helps to explain the almost bi-yearly transformation of one service into another. Because vehicles grow old and funding programs dry up, many systems have been unable to respond to the changes demanded by their communities, new legislation and advocacy and user groups. Because many funds may go only to certain recipients, it is often easier to scrap an established operation and begin again with new actors than to try to twist an existing operational structure to comply with the new constraints which accompany the meeting of new demands.

One major impact of funding uncertainty is that it makes long range planning virtually impossible. Communities rarely know where next year's funds will come from, how much will be available and how much must go toward vehicle replacement and salary and other operating cost increases. There is no basis upon which to stage system growth over a multi-year period. Coupled with rapid, dramatic and unpredictable reverses in legislation and policy, the general uncertainty of a funding base has been sufficient to impede any long range planning in 17 of the 18 communities examined (Orange County is the exception).

Organized Labor. Just as in line haul operations, union labor bears a mystique not entirely consistent with practical experience. Several communities have based their system approach and selection of lead and operating agencies primarily on the desire to avoid union involvement (Boston, Des Moines, Milwaukee, Broward County, Portland). Some of these efforts have been unusually successful (Des Moines), some have not (Boston).

Where union labor is present, evidence does not suggest that service is any less competent, responsive or efficient than on non-union systems (union systems exist in Lincoln, Columbus, Corpus Christi, Sacramento, Syracuse and Tulsa). Where they have not been involved, unions have rarely made an issue of their exclusion. Only in Boston were they successful in transferring the operation to union control--but only because of a clause in a 1913 contract forbidding the transit agency (which serves as the lead agency for the paratransit service) to engage any non-union workers in operations.

Despite the strong feeling pro and con on the subject, most decisions to either use or avoid union labor have been made unilaterally by one person or group in each community (Broward County, Milwaukee, Portland, Tulsa, Lincoln). Rarely did a discussion of this issue occur in a broad-based community setting.

Key Actors

Different organizations and community actors have played a number of roles with respect to establishing, funding and regulating systems, and keeping them going. In broad terms, roles have generally been consistent from city to city.

Social Service Agencies. More than any other group, social service agencies were responsible for starting special transportation programs (Baton Rouge, Broward County, Corpus Christi, Des Moines, Lowell, Phoenix, Portland, Syracuse, Tucson), or creating impetus within the community for others to do so (Tulsa). In fact, many early systems were small, one- or two-vehicle operations run entirely by social service agencies for their clients. As the state-of-the-art developed, social service agencies have tended to become more involved in funding, client referral and certification than in actual operations.

Advocacy Groups. Armed with favorable Federal regulations, advocacy groups have been instrumental in creating pressure in many communities for others to provide service. They have tended to play their strongest roles in communities which did not provide service until the late 1970's (Boston, Milwaukee, Orange County, San Bernardino) or where service was interrupted (Tucson) or insufficient (Sacramento). One striking exception is Lincoln, where a strong advocacy group obtained three vehicles in 1972 and immediately turned them over to the transit agency and requested service (which the transit agency began to provide soon thereafter). Once systems matured, advocacy groups tended to serve as spokespersons for user problems and issues in areas such as eligibility and trip prioritization.

Advisory Committees. Advisory committees played no role whatsoever in the system design process in most cities, and only a weak role in one of the 18 cities examined in this Project: Syracuse. As systems expanded and regulations (particularly the UMTA April, 1976 regulations) were promulgated, advisory committees gradually assumed greater decision-making responsibility, although most committees are strictly "advisory" and have no formal authority. Four of the 18 communities examined currently have no advisory committees at all (Corpus Christi, Orange County, Phoenix, Sacramento).

Metropolitan Planning Organizations (MPOs). MPOs played only a minor role until 1976, as they weren't designated as the focal point of planning until shortly after the UMTA 504 regulations of September 17, 1975. Since then, they have played major roles in paratransit planning and decision-making, particularly in communities which had no major special paratransit operations until the late 1970's (Columbus, Houston). More recently, with the appearance of the June 2, 1979 UMTA regulations, MPOs have become the major focal point for special planning in most cities, as the responsibility for preparing the required Transition Plans has fallen on their shoulders.

Transit Agencies. Transit agencies have rarely been involved in any aspect of special paratransit operations or planning other than serving as lead and/or operating agencies. In the capacity of lead agency, many transit agencies have performed the community's major paratransit planning (Boston, Des Moines, Orange County, Tulsa).

Governments. All levels of government have played active roles, yet in different ways. The Federal government has obviously had a major impact on both operations and planning as a result of legislation and regulations. States have played major roles, on occasion, where they have chosen to get involved (California, Delaware, Maine). And local governments have become involved in a few cases, particularly where "local" is synonomous with County government (Broward County, Milwaukee) or where local/county government is a structural part of the MPO (Lowell, Broward County). One exception is Lincoln, where the Mayor has taken a strong personal interest in the Handicapped and has established a community-wide accessibility program.

Future Trends

Several trends are expected to occur in the development of special paratransit systems. The most important of these are the increased coordination/consolidation efforts begun on the part of many communities and states (e.g., California), and the increased sophistication of operations, the latter hopefully as a result of the principles of operation illustrated by this Manual. The context of coordination/consolidation is providing new opportunities for communities to rationalize their existing services, and passenger-carrying efficiency should improve markedly as a result.

Other trends are uncertain. Many communities which have been saddled with high insurance costs have seen moderate relief during 1980 (See Volume II, Part III, Chapter Six: Insurance). As insurance companies become more familiar and comfortable with paratransit operations and their risks, and as providers improve training and maintenance procedures, costs may be expected to decline.

Another trend which may have dramatic impacts on paratransit service is the reprograming of social service agency funds into non-transportation-related endeavors. Much of this may depend on the posture taken by the new Administration vis-a-vis the existence and use of these funds. Much will also depend upon the skillful improvement of service at the local level for the too-rapid substitution of public systems for existing social service agency-funded ones may induce many agencies to "dump their clients" on the public system, greatly drying up a primary source of funds for this service.

Another trend involves improved vehicles, equipment and maintenance. Several companies have recently engaged in the modification of vehicles, creating a whole new line of wider, longer and more durable paratransit vehicles. And the "bugs" associated with lift equipment are expected to slowly work themselves out, as experience with the use of such devices increases. And with the gradual coordination/ consolidation of existing systems, maintenance facilities will likely shift from their current orientation to private garages to large, professionally run facilities, taking advantage of economies of scale in both equipment/parts costs and expertise.

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CHAPTER III: PLANNING AND COORDINATION

Introduction

Planning for special transportation is not yet on a par with that of line haul transportation. Many systems are extremely young, and community officials often consider them to be minor details within the broad context of transportation in general. Of the 18 communities examined in this study, formal planning studies related to special transportation have been conducted in only eight (Broward County, Corpus Christi, Des Moines, Lincoln, Milwaukee, Orange County, Sacramento, San Bernardino).

There are a few similarities among most cities in terms of their special transportation planning, primarily because identical regulations were imposed on them on several occasions. Yet, responses to these regulations have hardly been uniform. Prioritization by trip purpose is still extremely common, a few systems charge premium fares and some communities have no advisory groups--much less active, powerful ones. But the transition planning effort has done much to coalesce special transportation planning, organizing it where none had existed before, and clarifying and focusing it where it had been sloppy and omnidirectional.

The series of circumstances and accidents which shaped the evolution of special paratransit systems from city to city has had a much more profound effect on system development than Federal (or other) planning regulations. This diversity of histories helps to explain why, compared to line haul, paratransit systems are so remarkably dissimilar from one city to the next, and why so few innovations are shared among them (see Chapter II: HISTORY AND DEVELOPMENT).

The one feature of planning that does appear to be common to most communities is the very nature of planning itself. Most planning is dominated by short-range, pragmatic decision-making in which all members of the transportation community do not always participate. The mode of planning is often referred to as "operational planning," and is seldom tied to formal requirements. Those who are included either have a direct stake in operations (i.e., are accountable for system efficiency or effectiveness) or are extended the right to participate as a matter of political or institutional courtesy (e.g., much MPO involvement). Users, advocacy groups, local governments and social service agencies are usually excluded from these efforts.

The major question posed by planning is simply this: Are paratransit systems any better as a result of formal planning? At the moment, it is hard to answer such a question. But that is hardly an indictment of planning in general. Rather, it reflects the youth of these services and the fact that almost all systems seem so haphazardly designed that even extensive planning after-the-fact would not likely have a noticeable effect for several years. If nothing else, the existence of an active planning process shields a community from one of the most troublesome issues: lack of user input. Clearly, certain types of issues (level change limitations, eligibility restrictions, etc.) have emerged less frequently in communities where potential system users were involved in the design process.

The remainder of this Chapter will attempt to characterize the special transportation planning efforts of the 18 communities examined in this Project over the past several years of their development. Five areas will be examined in some detail:

-- The Planning Process;

-- Planning Activities;

-- Involvement in the Planning Process;

-- Regulations and their effects on Planning and Service, and

-- Coordination.

The Planning Process

The majority of U.S. cities now have formal processes for special services planning, and most had them even before the June 2, 1979 (504) regulations. In fact, there is no real correlation between the existence of a formal planning process and the starting date of a community-wide paratransit operation.

Formal special user planning processes normally take one of three basic forms:

-- They are part of a larger, formal, broad transportation planning process (Columbus, Phoenix);

-- They are separate from line haul and other transportation planning, and are usually performed with heavy input from, or in conjunction with, metropolitan planning organizations (Baton Rouge, Broward County, Corpus Christi, Des Moines, Lowell, Milwaukee, San Bernardino Tucson), or

- -- They are separate from other transportation planning, and have no MPO involvement (Orange County, Sacramento, Syracuse, Tulsa).*

Many times the MPOs take the lead role; other times, lead agencies do--although no consistent pattern seems to stand out which would explain either.

Several communities have no formal planning, for a variety of reasons:

- -- Boston's lead and operating agencies are heavily laced with handicapped persons (including both Directors), and key personnel have developed a close working relationship for years, as they began the service literally from scratch;
- -- Houston's MPO has expressed little interest in special planning activities, and the system's gradual transformation into a brokerage system has been more a question of mechanics than planning decisions. In addition, informal contacts with advocacy groups have been strong;
- -- Lincoln's two major advocacy groups--one representing the Handicapped, the other, the Elderly--have so dominated development of the service that additional user input was felt to be extraneous, and
- -- Portland's system officials have constant and close contact with a variety of users, social service agencies and community groups, and many of those who would ordinarily participate in a formal planning effort feel that their inputs are received effectively through the existing informal structure.

These positions and situations do not, nor are they meant to, justify the absence of a formal planning process, but they do help to explain why one has not existed. And it is also quite apparent that user input filters through to system officials much better and faster in a good informal setting (Portland) than in a weak (Orange County) or diluted (San Bernardino) formal one. The keys to responsible decision-making are knowledge and good faith, and formal planning processes do not appear to provide either.

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*Orange County participates in broad special service planning with its MPO, the Southern California Association of governments (SCAG), but this planning rarely involves operational details of any participating communities.

Finally, the special service efforts of a few communities occur within the budgetary process (Boston, Columbus). Unfortunately, paratransit often gets lost in such a structure, particularly in large cities, where such a process serves more of a monitoring than a planning function.

Planning Activities

What has occurred within special service planning is quite different from that of line haul or general transportation planning. For one thing, few special service planning efforts are manned by full-time professional staffs. Often, only one planner is assigned to paratransit (Portland), sometimes only on a part-time basis (Tulsa). More often, there are none. "Planning" then boils down to regularly (or irregularly) occurring meetings among system operators, regional government representatives, users and advocacy groups.

Although several communities have performed major studies (usually contracting them out to consultants), long range paratransit planning is rare. For one thing, the uncertainty of the 504 regulations left too shaky a future to plan for. For another, many communities barely have a grasp on current paratransit operations, much less an idea about staging growth. And finally, there often aren't enough resources available to support any significant planning.

One community which has engaged in long range planning is Orange County. Here, a six stage, three year plan for system expansion has been designed and detailed. However, practically every year the community experiences a major change in regulations (Senate Bill 620, Assembly Bill 120), economic environment (Proposition 13) or legal status (lawsuits from service providers challenging the Transit District's right to operate fixed route service with paratransit vehicles). As a result, plans are constantly revised before old ones can be implemented. Changes in coverage from city to city have occurred so fast that many users have dropped out of the system because they can't keep track of them. Such an experience -- particularly in light of ever-changing Federal regulations -- certainly questions the wisdom of engaging in long-range planning in the paratransit field.

Of the planning activities normally engaged in, several types appear common to most communities:

-- Discussions of issues, particularly those related to ride-limiting factors such as eligibility and trip purpose priorities;

-- Discussions of funding problems;

-- Discussions of coordination;

-- Discussions of fare policy and operating hours;

-- Explanations of Federal regulations and discussions about reconciling them with user needs;

-- Discussions about vehicle acquisition and resulting service expansion, and

-- The examination of current and future operating budgets.

Rarely, if ever, do formal planning sessions include discussions of detailed operational considerations, such as service concepts or deployment schemes. Seldom discussed are maintenance- or vehicle-related issues or problems, except where they affect equipment design or performance failures. And seldom discussed are scheduling and dispatching approaches and procedures, except where trip priorities are affected. These concerns are normally left to lead and operating agencies, even though their impacts on system users may be just as great as those of items which are covered.

Involvement in the Planning Process

Participation in the planning process differs from city to city. And although certain factors dictate one's participation (e.g., all lead agencies are involved), participation in planning from city to city seems to bear little relation to participation in operations or funding.

An all-inclusive planning body would probably contain representatives from the lead agency, the MPO and an advisory committee. Yet this exact mixture was found in only four of the 18 communities examined in this study (Baton Rouge, Corpus Christi, Lowell, Syracuse).

How much effect planning body composition has had on the shape of paratransit service is also hard to determine, since both operations and planning body compositions differ so greatly. Patterns along these lines are almost impossible to detect.

Right now, the only community members with any sophisticated operating skills or understanding are service providers. Ironically, unless they serve as lead agencies as well, service providers are almost universally excluded from the planning process.

Involvement in planning, by user group, has been as follows:

- -- Metropolitan Planning Organization (MPO) -- MPOs have been directly involved in special service planning in 10 of the 14 communities examined which had a formal special service planning process, but in only one of four communities where there was no formal process. One important common characteristic of all seven communities with no MPO involvement (Boston, Houston, Lincoln, Orange County, Sacramento, Syracuse, Tulsa) is the fact that the transit agency served as the lead agency. This fact may suggest that when sufficient planning expertise exists outside of the MPO, the MPO's participation is not so essential. Further analysis shows that lead agencies in the 11 cities where MPOs participated included six government agencies and only five transit authorities, one of which was just an umbrella agency.

- -- Local Governments -- Local governments themselves are, next to non-lead agency service providers, the least likely actors to participate in special service planning -- further evidence of the MPO staff's assumption of this responsibility. Generally speaking, local governments have been involved only when local government was ostensibly county government (Broward County, Milwaukee) or where it served as the lead agency (Des Moines). The two exceptions to this rule were Phoenix, where the City Manager's Office administers the transit agency and shares the MPO's planning staff, and Lincoln, where the Mayor has had a personal interest in handicapped persons. Thus, local government involvement has stemmed from a series of incidental connections to the paratransit service rather than from any requirements for involvement or from any expertise it had to contribute;

- -- Transit Agencies -- Unless they serve as lead or operating agencies, transit agencies are almost never involved;

- -- Operating Agencies -- Operating agencies are rarely involved unless they serve as the lead agency as well. Two exceptions are Boston, where operating officials were involved in the system's origin and where the Director of the operating agency is the former Director of the lead agency, and Des Moines, where the operating agency (but not the lead agency) is the transit authority;

-- Advisory Committees--Advisory committees have participated in planning in 14 of the 18 cities examined. But this tells only part of the story:

- the four cities with no formal planning process all had active advisory committees--although without a formal process, their powers were severely limited, and

- Des Moines is one of the 14 cities with an advisory committee, but the committee contains only funding agency representatives and system officials.

Even among those communities which had advisory committees, many of those committees either had little power or formal authority (Boston, Broward County, Columbus, Houston, Milwaukee, Portland) or had been excluded during the system's design process (Baton Rouge, Broward County, Boston, Columbus, Des Moines, Milwaukee, Tucson, Tulsa). There appears to be no pattern among these communities which would explain their relative powerlessness. More important, however, is the fact that powerful advisory committees have existed throughout the design and planning processes in only ONE of the 18 communities examined--Syracuse--although users were heavily involved in the design stage in three others (Lincoln, Lowell, Sacramento).

-- Funding/Sponsoring Agencies--Funding agencies have rarely been involved, and only when participating in a brokerage system (Houston);

-- Social Service Agencies--Social service agencies also have rarely been involved in planning. Exceptions have occurred where they assisted the lead agency in performing certification, client referral or other user-related operating functions (Lincoln) or where they served as the lead agency (Baton Rouge, Phoenix), and

- Government Corporations or Agencies--Government agencies have been involved only when they functioned as lead agencies (Broward County, Des Moines, Phoenix, Tucson) or were otherwise involved in the funding or public accountability of the program (Milwaukee).

Regulations and Their Effects on Planning and Service

Both Federal and State regulations have had profound effects on paratransit operations, but only Federal regulations have directly affected planning. Three sets of these regulations were significant in their immediate impacts on planning:

- UMTA/FHWA "Joint Planning Regulations" of September 17, 1975--The "Joint Planning Regulations" called for the establishment of Metropolitan Planning Organizations (MPOs), and made them the focal point of regional transportation planning. Thus, when subsequent regulations began focusing attention on paratransit, the MPOs naturally assumed the lead role in this effort--largely because they had professional planning staffs on board. As mentioned earlier, MPOs played major roles in special service planning in 11 of the 18 cities examined;

- "Special Efforts" Regulations of April 30, 1976 -- These regulations made paratransit planning a formally required activity.

  Impacts of this regulatory package have been mixed. The requirement for formal special service planning and "Special Efforts" did stimulate planning efforts in many cities which up to that point had had no centrally organized paratransit service. Of the 30 major operations examined in this Project, 19 of them began after April, 1976 (although these encompass only nine of the 18 communities which house such operations).

- 504 Regulations of June 2, 1979 -- These regulations did more to promote community-based special service planning efforts than any previous regulations, as they called for the establishment of a broad-based planning group in order to produce a document to comply with the regulations. Because most community members know little about paratransit operations, it is not clear that the Transition Plans produced any tangible service-related results. Rather, the Plans simply mirror existing conditions. Few of the communities examined had begun serious transition planning efforts before December, 1979. The fact that it took them six months merly to gather a group of people together is an indication of how far these communities have come -- and how far they still have to go. Nevertheless, the bringing together of community members for a united effort in planning for special transportation needs was a significant and much-needed step in the evolution of special service planning.

Taken as a whole, this package of regulations has had several significant and quite unintended effects on special service planning:

-- Although these regulations did create and bolster the MPO's role in planning, MPOs are not universally involved in special service planning: they do not participate in seven of the 18 cities examined;

-- The regulations seem to have had no impact on the participation of advisory committees in planning. Of the 11 cities visited by the Project Team before December, 1979, when most transition planning efforts began getting under way, advisory committees existed in some form in nine of them. Yet they only existed in three of the six cities visited after this date.*

-- The most interesting impact of the regulations, particularly those of April, 1976, was on eligibility. Of the nine communities operating special paratransit service before these regulations were promulgated, all permitted non-handicapped elderly people to use them. Of the nine communities which began operating systems after the regulations, only three accepted non-handicapped elderly people.

There are several possible interpretations of this alignment. The one which seems most plausable is that those communities which had done nothing until forced to by the regulations were reluctant to go beyond the minimum requirements. In contrast, the generosity exhibited by those communities which had provided special service on their own naturally extended it to elderly as well as to handicapped people. If this were true, then the regulations can hardly be said to have forced the exclusion of elderly people from paratransit. If would be fairer to say that, at least, the regulations got these communities to do something.

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*The three cities counted without advisory committees include Des Moines, which technically has an advisory committee, but one composed entirely of system officials and funding agency representatives.

There is another viewpoint which is supported by the histories of many communities which started providing service prior to the April, 1976 regulations. Most paratransit systems began by serving either elderly or low income persons; many systems served only program-affiliated clients, as well. This being the case, when, like everyone else, they were directed to provide service to handicapped people, they merely added them to existing services for elderly people and poor, rather than start up entirely new ones. And the idea of replacing elderly with handicapped individuals was political suicide--although in subtle ways, many systems have shifted their emphasis from elderly to handicapped persons as the systems evolved.

Coordination

Coordination is still a thing of the future in most communities (see Chapter VI: PROBLEMS: Lack of Coordination), and despite language to the contrary, Federal regulations have done little to encourage it. If anything, Federal regulations have undermined coordination, either through those connected with the 16(b)(2) Program or in other, more indirect ways -- as, for example, through the Section 15 FARE Reporting Requirements (San Bernardino). And where they have attempted to interface in this area, state regulations have been either extremely counterproductive (California) or dramatically effective (Maine).

Indirectly, Federal regulations have laid the foundation for considerable improvements in coordination in the future, even though such improvements have not occurred in the short run. At minimum, the lack of coordination has been recognized by community members to be a serious service- and cost-related problem. As a consequence, even bastions of autonomy like Lowell, Massachusetts have been able to effect coordination arrangements with surrounding communities. Phoenix now operates a 27 member inter-agency trip-sharing program. Sacramento has been able to effect coordination of scheduling and dispatching, training, insurance and fares -- not to mention a major coordinated maintenance demonstration project (financed by state funds). And several communities have begun client cross-referral services (Lincoln, Milwaukee, Broward County, Phoenix, Tulsa).

There are many reasons why the recent surge of special service planning activity has not produced immediate widespread results in coordination. For one thing, few communities have even mastered the intracacies of operating a separate system, much less trying to do so in conjunction with several others. In addition, members of many transportation communities are just beginning to recognize the benefits of extensive coordination. And the Federal government has splintered funding programs among numerous Departments, making coordination or consolidation at the local level difficult.

In summary, until a state-of-the-art emerges and is absorbed at the local level which explains not only the benefits of coordination but how to effect it, and until Federal and state regulations begin to reflect operational, jurisdictional and political realities at the local level, coordination will remain more of a goal than a reality.

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CHAPTER IV: USER AND COMMUNITY IMPACTS

INTRODUCTION

Special paratransit service undoubtedly has been a great asset to its users, many of whom have no other transportation alternatives. Beyond that, little is known about more precise impacts of such service, for many reasons:

-- Overall demand for service is not known. Of those elderly and/or handicapped persons who might be eligible for special paratransit service, it is not known in all cases what transportation alternatives they have, nor how often they use them. And latent demand is further clouded by the lack of marketing and outreach in most communities: it is not known what demand would be if the entire eligible user group knew about the service;

-- The number of trips of each type needed by most members of the various user groups is not generally known;

-- Few systems record odometer readings and/or time (hours and minutes of pick-ups and drop-offs), and thus, cannot accurately estimate trip lengths, ride or wait times;

-- Demand is hard to determine, because only part of a person's trip needs may currently be served, or because trip requesters may give up after an initial few rejections. The true number of trips needed may also not be requested, as users are dissuaded by their knowledge of limited supply. Also, the articulation of demand for various user groups changes along with new social forces and awareness; and

-- Quality-of-service information is rarely determined by user interview.

In such a data vacuum, the determination of many impacts of these services is all but impossible. For example, one could not hope to evaluate how well a system meets a certain trip need (e.g., social/recreational) for a certain user group (e.g., elderly persons), even though complaints about inadequate service of specific types are common. Furthermore, the transportation needs of non-users are difficult to quantify.

Despite these limitations, it is possible to examine factors which limit system use, and to explore how and on whom those factors operate. The remainder of this Chapter will examine four aspects of impacts:

-- What demand is;

-- How demand is met;

-- Why it is not met (i.e., ride-limiting factors), and

-- What impacts special paratransit systems have had on communities as a whole.

DEMAND

Actual Demand

The most accurate picture of demand for special paratransit service appears in the National Survey of the Transportation Handicapped, published by U.S. DOT in June, 1978. According to the National Survey, five percent of the urban U.S. population is transportation handicapped, meaning "unable to use public transportation all, most or some of the time."* Of these five percent, approximately one half (47%) are elderly (over 65 years of age). About 10 percent of all persons are elderly (over 65). Thus, eliminating the double-counting, the elderly and handicapped population breaks down as follows (for urban areas):

-- Non-elderly Handicapped	2.5%;
-- Elderly-Handicapped	2.5%, and
-- Non-handicapped Elderly	7.5%
-- TOTAL	12.5%.

Of this 12.5 percent of the urban U.S. population, it is unclear how many have other transportation alternatives. Clearly, 7.5% -- or more than half of the 12.5% total -- are non-handicapped elderly persons, and physically able to use line haul transportation. Many of those persons, and some of the remaining five percent, have access to an automobile.** And many can either afford taxis or private ambulance services, or have access to programs which pay for such services.

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*This figure does not include persons who simply live too far from bus stops to use transit.

**According to the National Survey, 83 percent of the transportation handicapped have access to an automobile (66 percent of them as a passenger only). In addition, 14 percent use taxis, 29 percent use conventional line haul transportation, and one percent use association van service.

Occasionally, communities vary widely from the national norm in elderly population, particularly in Southern Florida (Broward County, e.g., has 30% of its population over 60 years of age), Southern California and Arizona.

Several of the communities examined in this Project have undertaken complex demand and/or user needs surveys (Baton Rouge, Boston, Columbus, Des Moines, Milwaukee, Orange County, San Bernardino, Tulsa). In almost every case, these surveys have run up against the essential unknowns (i.e., use of alternative modes), but have avoided outright failure of the survey by ignoring the consideration of such alternatives. As a result, all studies and surveys have grossly overestimated demand (Milwaukee officials claim the margin of error in its survey was 500%).

Articulated Demand

Many persons (within the broad class of general demand) have requested service at one time or another, and many are currently receiving it. In a very loose sense, this portion of demand may be referred to as "articulated" demand. But even this notion has its problems:

-- The lack of marketing and outreach common to almost all systems, and barriers to the client referral process, have shielded many would-be users from any knowledge of either a system's existence or their eligibility for it;

-- The small number of vehicles and the knowledge and suspicion about waiting lists have discouraged many would-be users from even requesting service, and

-- After a few rejections, potential users stop requesting service. (Thus, in calculating rejection rates, system officials compare hundreds of trips for each user served against a handful of rejections by non-users. Few systems even keep a waiting list (Syracuse).)

In a more perfect world, the trip requests articulated would be a reliable proxy for actual demand. At present, they are not.

Trip Needs, by User Group

It frustrates many system and community officials that the mysteries regarding general demand prevent them from quantifying, by specific user group, more precise notions of demand.

Qualitatively, such demand is clear. Non-elderly handicapped persons commonly need transportation to work and school, and many of their social and recreational needs can only be met at night and on weekends. In addition, their travel patterns -- especially with regard to specialized medical treatment and other special programs -- tend to be widespread, and they rarely live in clustered enclaves. Because of these factors, trip needs (other than for work and school) usually cannot be met with highly efficient subscription service or during normal weekday operating hours. Rather, they require demand-responsive service, and most commonly during either peak periods of system demand (rush hour) or during evening and weekend off-peak hours. And many need personal assistance to reach and board the vehicles.

Elderly persons for the most part have very different needs. Medical and shopping trips are often their highest priorities, with trips to nutrition sites and other social service programs. Many of these programs are centrally located. In addition, most of their medical-related needs can be met by centrally-located facilities, such as county hospitals, and shopping trips can be made to nearly stores. The social-recreational needs of the elderly can usually be met during the mid-day off-peak period, when paratransit systems generally have the most excess capacity. And their social/recreational needs are often close by, many community-oriented. And many elderly persons live in special senior citizens housing complexes. Finally, many need no level change or boarding assistance.

It doesn't take long for a system official to realize that the non-handicapped elderly can be served much more efficiently than the non-elderly handicapped. This basic reality is at the root of why many of the most efficient systems examined (Broward County, Portland) provide enormous numbers of trips to elderly people while virtually ignoring handicapped people. Only Tulsa has been able to provide low-cost service to handicapped people but has done so by focusing largely on group trips for handicapped school childred, picking them up 30-at-a-time at schools or other central locations. Only Orange County has attempted to design a service concept that reflects the basic trip needs of these two broad user groups, although in so doing, it has experienced the lowest system efficiency of any of the 18 communities examined in this study.

MEETING DEMAND

Although figures are sloppy and often have no statistically-valid basis, many communities have attempted to estimate the degree to which special paratransit service is meeting the needs of its eligible user groups. The following figures were cited by system officials, or estimated by Project Team members, about the demand met by their systems:*

-- Baton Rouge --	"small fraction" overall; 9% of wheelchair users;**
-- Boston --	1% of Boston's handicapped population;
-- Broward County --	(less than 1%);***
-- Columbus --	7.1% of the elderly & handicapped population;
-- Corpus Christi --	3% of the Handicapped;
-- Des Moines --	20% have used it at least once;
-- Houston --	1-1/2% of the Handicapped people
-- Lincoln --	less than 1% of the Elderly and Handicapped population
-- Lowell --	6% of Elderly people; handicapped person usage is unknown;
-- Milwaukee --	(less than 1%);***
-- Orange County --	"small fraction;"
-- Phoenix --	less than one tenth of one percent;
-- Portland --	"small fraction;"
-- Sacramento --	(less than 1%);***
-- San Bernardino --	"small fraction;"
-- Syracuse --	(less than 1%);
-- Tucson --	(small fraction);***
-- Tulsa --	"small fraction."

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*These figures are always based on overall demand, not taking into consideration other alternatives or possible participation in other special paratransit programs. As a result, these numbers are probably much too low.

**According to the National Survey, these persons make up only about 5% of the overall handicapped population.

***This is a Project Team estimate.

The lack of precision in these figures does not obscure the obvious realization that demand, whatever it is, is far greater than is being met by existing paratransit or other public transportation services (e.g., fully accessible line haul). Because this is so, and because paratransit systems grow incrementally, the inability to pin down precise demand has been more frustrating than significant. Regardless, with demand so much greater than supply, most communities have chosen to limit demand by controlling supply. Thus, among all 18 communities examined, none perform any significant marketing activities, even though many systems have an amount of excess capacity during the mid-day off-peak period. And even those systems providing thousands of passenger trips per month often deliver less than one trip per month per identified would-be user (Baton Rouge, Broward County, Houston, Lincoln, Lowell, Phoenix, Sacramento, Syracuse). And most systems serve only a small fraction of their "eligible" or certified users.

The percentage of trip requests turned down, commonly referred to as the "rejection rate," is often used as a proxy for illustrating how well demand is met. After one or two rejections, however, many would-be users abandon their attempts to obtain service, and their needed trips go unrecorded, as opposed to the tabulation of every passenger trip actually provided. Every single community citing such a "rate" has had one well under five percent. Thus, this figure tells us absolutely nothing about the degree of articulated demand being met.

Much of the debate which has occurred in recent years with regard to unmet demand has taken place in communities with large, well-developed, early-established systems providing extensive service to the Elderly (Broward County, Phoenix, Portland, Tulsa). As handicapped groups and individuals became more vocal in their demands, the gap between service and articulated demand became wider and more noticeable. Because fleet growth tends to be constrained by vehicle life span, much of this unmet need could only be met by excluding previously eligible system users:

Person Eligible to Use The System

System	Handi-capped	Elderly	Low Income*	General Public
Baton Rouge	X			
Boston	X			
Broward County (SST)	X	X	X	
Broward County (Handicab)	X			
Columbus	X	X		
Corpus Christi	X	X		
Des Moines	X	X	X	
Houston	X	X	X	
Lincoln	X	X		
Lowell	X			
Milwaukee	X			
Orange County (Dial-A-Rides)	X	X	X	X
Orange County (Dial-A-Lift)	X			
Phoenix (Dial-A-Ride)	X	X		
Phoenix (Red Cross)	X	X		
Phoenix-Mesa	X	X	X	X
Portland	X	X	X	
Sacramento	X	X		
San Bernardino (Dial-A-Rides)	X	X	X	X
San Bernardino (Dial-A-Lifts)	X			
Syracuse	X	X		
Tucson	X			
Tulsa	X	X		

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*Those communities considered here are those which provide service to non-handicapped and non-elderly low income persons. Many communities charge low income persons less (Tucson) or nothing (Baton Rouge), but all must be either elderly or handicapped. A few cities have large, entirely separate systems for low income persons (Phoenix).

In addition to broad eligibility, emphasis on trip purposes accommodated differs considerably, not always correlating with differences in eligibility:

PERCENTAGE OF TRIPS DELIVERED, BY TRIP PURPOSE:*

System	Trips/ Month	Medical	Work	School	Nutrition	Social Serv.	Social Recrea.	Shopping	Other**
Baton Rouge	3000	23	(See other)	(See other)	1.	(See med.)	18.2	36.6	11.2
Boston	5600	26.3	41.3	11.3	-	-	13.2	.4	7.5
Broward (SST)	26000				69				
Columbus	2000	14	56	16	-	-	2	3	9
Corpus Christi	4000	26.7			69.3	(See nutr.)			1.8
Des Moines	8500	10	9.5	3.1	67	-	.4	10	-
Houston	3150	(...MOST...)							
Lincoln	4000	47	25	15	-	-	13	(see soc/rec)	-
Lowell	2100	29.4	31.6	.2	.8	9.3	8.6	7.4	12.9
Milwaukee	5000	25	15	2	2	-	23	9	24
Portland	6400	31	5	-	21	18***	1	22	-
Sacramento	4000	60	20	(See work)			5	5	
Syracuse	6000	29.7	10.6	3	-	9.1	24.4	1.8	21.4
Tucson	16000	24	-	-	(See soc/ser)	51.8	4	11	11.4
Tulsa	8200	13.9	3.6	2.2	37.1	-	8.7	33	1.4

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*Cities which had no breakdowns for these numbers have been excluded from this table.

**This "other" category contains different trip types in each city. For example, in Tucson it includes work and school trips, whereas in Syracuse, it includes trips to nutrition sites.

***All of these trips are to sheltered workshops. Many cities consider these trips "school" trips rather than social service program trips.

RIDE LIMITING FACTORS

The remainder of this Section discusses four classes of ride-limiting factors and their impacts on various user groups:

- Informational Barriers--those factors which prevent potential users from learning of or about the service;
- Service Acquisition and Feasibility Barriers--those factors which prevent potential users from obtaining service, or which render it useless;
- Accessibility Barriers--those factors which prevent potential users from reaching the service once they are eligible, and
- Ride-related Barriers--those characteristics of the system that make it difficult or impossible to use.

Informational Barriers

Informational barriers prevent potential users from learning of the system's existence, whether or not they qualify for service, whether it is beneficial for their needs, and if so, how to obtain it. Major ride-limiting factors of this type include limited marketing and outreach services, constraints to client referral and rapid system change.

Limited Marketing and Outreach. By not marketing or providing outreach, a deluge of demand is avoided. None of the 18 communities examined in this Project currently perform even moderate marketing activities, much less large-scale, effective ones. This policy has had two serious, undesirable consequences, particularly in communities where the service is invisible to many qualified would-be users. First, many systems are greatly underutilized during the mid-day off-peak period (Boston, San Bernardino, Orange County, Lowell). Second, when not marketed openly, service tends to be skewed toward agency-affiliated clients, as social service agencies make substantial efforts to inform their clients about available transportation services as a means of facilitating their own service delivery programs. Many non-agency-affiliated persons never hear about such service.

Client Referral. In the absence of marketing and outreach programs, many potential users are notified by organizations or individuals familiar with the service: social service agencies, hospitals, doctors and current system users. Much of this is informal, as for example, where doctors learn about the service from patients who use it and pass the information on to other potential users. And some users participating in social service programs relate their experiences to other program participants who don't know about the system.

Client referral generally works best when social service organizations actively seek out users. In some communities (Broward County, Tulsa), community-wide service coordinating agencies focus on disseminating information to non-agency-affiliated users, the most isolated of potential users.

Constant System Change. When system changes are publicized, many current users miss the notifications of the change. Orange County encountered this problem when a partially-implemented mixed-moded service (combination of small vehicle fixed route and demand-responsive service) was scrapped and replaced with the gradual, six-stage, three-year implementation of a modular Dial-A-Ride system, one affording elderly persons exclusive use of the service during the mid-day off-peak. Many of those who suddenly found themselves without their accustomed service lost interest in chasing it down. When new service was again installed, many didn't bother to find out about it.

Service Acquisition and Feasibility Barriers

System characteristics which prevent certain potential users from obtaining service, or from using it effectively once they are eligible, operate as serious ride-limiting factors. These factors range from a shortage of vehicles and limited operating hours to constraints in trip reservation or certification procedures.

Fleet Size. This is far and away the greatest and most common ride-limiting factor. Very simply, there are not enough vehicles available to meet articulated demand, either in general (Broward County, Baton Rouge, Columbus, Corpus Christi, Lowell, Portland, Syracuse, Sacramento, Tucson) or at certain times of the day (Boston, Houston). In addition, there may not be enough lift-equipped vehicles to go around (Baton Rouge, Corpus Christi, Des Moines, Portland), and as a result, wheelchair users receive either proportionally less service than other user groups or at least less service than they ordinarily could obtain were more vehicles lift-equipped.

More than any other factor, limited fleet size has resulted in the emergence of other ride-limiting factors, such as level change limitations, eligibility restrictions or trip priorities. Because a.m. and p.m. peak hour demand is greatest in most communities, the handicapped people (who attend work and school) feel the impact of this ride-limiting factor, through its indirect consequences, more than the elderly -- even when the vehicle shortage is a general one rather than one related to lifts or ramps.

Service Area. In a few communities, the service area either doesn't include portions of the region where significant demands for service exist (Tulsa), or doesn't serve many destinations desirable to users within the service area (Lowell, Orange County Dial-A-Ride, Phoenix Dial-A-Ride).

The Phoenix Dial-A-Ride case is most interesting in terms of its basic problem. Phoenix Dial-A-Ride's 168 square mile service area, covering only about half of the City of Phoenix, evolved from a nutrition program-based service, designed to service specific census tracts. As a result, the service area encompasses only an estimated 18% of destinations needed by those eligible users who presently reside in the service area. Yet, rather than making arrangements to extend service beyond the current boundaries, the Dial-A-Ride allows otherwise qualified users living outside the service area to use the system if they can get to a service area boundary by their own means.

Service Concept. Certain service concepts afford much better service to users in certain portions of the service area than in others. Systems which employ an inner-outer zone approach (Lincoln, Portland, Syracuse) deliberately provide less service to outer-zone areas--partly because demand is less there, and partly because the efficiency of serving users in those sparse areas is low.

Service concepts which employ modules or zones and which require transfers between adjacent zones (Orange County, San Bernardino) limit ridership in three ways. First, transfers from every module to every other module are not always allowable (San Bernardino). Second, the user has to pay a new, full fare at each transfer. Finally, travel involving so many transfers is extremely time-consuming. Taken together, these problems deter most users from taking long trips, or even trips of moderate length when reoccurring.

Location in Service Area. Even service concepts which don't officially discriminate against portions of the service area sometimes deliver lower levels of service to certain portions of the area, particularly outlying areas where demand is sparse and trip lengths long. Some systems will only serve these areas during slack periods (e.g., mid-day off-peak) or when a drop-off is nearby. A service area need not be large for system officials to impose such a constraint (Boston's is only 22 square miles); the criteria seem to be relative density, ride-times and available capacity.

Operating Hours. Because different user groups have trip needs which can only be met during certain hours, systems which operate only during weekdays limit much trip-taking. The absence of evening service is often a severe hardship to handicapped persons, who need paratransit service for social-recreational purposes at night (Phoenix, San Bernardino, Tulsa). Often, evening hours are limited, and passengers are stranded at destinations (Columbus). Fear of this tends to discourage them from making the front end of the trip. To mitigate this problem, a few systems hire taxis to provide return trips outside of the basic operating hours (Corpus Christi, Des Moines, Tulsa). Tucson's Handi-Car provides trips outside of regular operating hours by appointment.

The lack of weekend service has been a ride-limiting factor in a few communities (Columbus, Phoenix, San Bernardino), primarily for those who work during the week. San Bernardino's Dial-A-Ride, which serves the elderly people and general public, operates on weekends in some communities, whereas only one of its three Dial-A-Lifts for the Handicapped operates on weekends. Dial-A-Lift was designed to provide a higher level of service to its client group, which it doesn't do in this sense.*

Of those communities whose systems deliver weekend service, some provide it only on Saturday (Orange County, Sacramento) and some only on Sunday (San Bernardino).** When systems provide both, Sunday service is usually shorter, since the accommodation of church trips, the main purpose of Sunday service, ends shortly after lunchtime (Boston, Lincoln). One exception to this rule is Syracuse, which operates longer on Sunday.

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*One mitigating factor is that handicapped persons in these communities are also eligible to use Dial-A-Ride as well, and presumably, when demand is low on weekends, Dial-A-Ride meets their needs.

**In San Bernardino, operating hours are somewhat different for all the communities served. Some cities receive service on Saturdays, others on Sundays.

Eligibility. Eligibility is obviously a major ride-limiting factor. A great many systems do not serve the non-handicapped elderly people (Boston, Lowell, Milwaukee, Tucson, Columbus) and a few offer them lower levels of service (Orange County, San Bernardino) by including them only on general dial-a-ride. No system currently excludes handicapped people although several give them far less service than elderly persons (Broward County, Portland), either because of funding constraints or demographics (Broward County, e.g., is 30% elderly), or because too few vehicles are lift-equipped (Broward County, Corpus Christi, Des Moines, Portland).

A few communities' eligibility criteria discriminate against small subgroups of a broad user group: Milwaukee doesn't include the mentally-retarded, Orange County excludes blind, deaf and mentally-retarded persons from its Dial-A-Lift service for handicapped people and Baton Rouge allows elderly persons between 60 and 64 to use the system only for nutrition trips. Eligibility criteria have also been more noticeable in their ride-limiting capacity where they have removed service from those who had been receiving it (Lincoln, Baton Rouge, Portland) -- although here, the real barrier may be the certification process (Portland).

Trip Limits and Priorities. As different user groups have different trip needs, trip priorities and limits become ride-limiting factors for only certain users.

The most common and most often tolerated of these priorities are those which afford the highest level of service to medical trips (Broward County, Houston, Phoenix Dial-A-Ride, Phoenix Red Cross, San Bernardino, Tulsa). Where such policies are not formally adopted, most reservation clerks and dispatchers generally try to accommodate medical trips, particularly in emergency situations, before any others. A few systems afford higher priorities to other types of trips as well as medical ones: Corpus Christi -- nutrition trips, and Broward County Handicab and Lincoln -- work and school trips.

More commonly, trip purpose priorities are effected indirectly by either the building of operations around certain types of service (e.g., subscription service) or by providing immediate-response service only for certain trip needs (e.g., medical emergencies).

None of the systems examined in this Project imposed any limits on the number of trips taken, although excessive fares for long trips (Milwaukee, Orange County, San Bernardino) served to limit trips indirectly. Milwaukee's User Side Subsidy program discriminates against long trips for purposes other than work, school and medical.

Type of Service (i.e., subscription, pre-scheduled demand-responsive or immediate-response). Type of service choices pose the most direct tradeoffs between efficiency and effectiveness: the more limited pick-ups and destinations are and the further ahead trips can be pre-scheduled, the more trips per hour can be provided. At the same time, advanced registration and priorities for group trips limit rides for many persons, and skew service toward agency-affiliated trips for elderly persons.

Because immediate-response trips are costly and disruptive to otherwise "orderly" pre-scheduled service, many systems either don't provide them (Columbus, Corpus Christi), provide them only for medical emergencies (Broward County, Des Moines, Houston, Lowell, San Bernardino, Tulsa) or provide them only when their insertions into existing schedules can be easily accommodated (Baton Rouge, Boston, Lincoln, Phoenix, Portland, Sacramento). System thinking commonly holds that trips for reasons other than medical emergency can be pre-scheduled without placing undue hardship on any user. In reality, this is not so, because many spontaneous trip needs (social/recreational, shopping), though not critical to life and death, are not accommodated when immediate-response service is restricted.

Immediate-response service is a double-edged sword, and the confusion over how much to provide, and under what conditions, is understandable. Decisions to provide it for medical emergencies is clearly one of effectiveness. Extending it further tends to improve efficiency in the short run (immediate-response insertions, if properly handled, can round out schedules with gaps in them) and undermine it in the long run (users whose trip needs are likely to be met on an immediate-response basis are less diligent in pre-scheduling them).

At the other extreme, the emphasis on subscription trips clearly limits rides for those whose activities are not regularly reoccurring. Subscription service generally improves access to work and school, dialysis, therapy, nutrition and other social service programs and shopping. It generally ignores isolated trip needs such as medical appointments (except at clinics and hospitals), social-recreational activities and trips for irregularly occurring activities such as job interviews. And often, when subscription service is tied up in serving nutrition programs during peak hours, work and school trip needs are poorly served. In terms of user groups, subscription service which focuses on work and school trips tends to exclude elderly people (Lincoln). Service oriented toward nutrition and other social service programs tends to exclude non-elderly handicapped persons (Portland, Broward County).

A few systems have tried to reconcile trip needs with the unavoidable efficiency-effectiveness tradeoff by concentrating on different types of service at different times of day--particularly with subscription service during the peak hours (Houston, Orange County Dial-A-Ride, Portland) or by providing different types of service with different vehicles (Broward County, Tulsa). Nonetheless, most systems simply build their schedules around subscription service and fill in gaps with pre-scheduled demand-responsive or immediate-response service (Baton Rouge, Boston, Columbus, Corpus Christi, Des Moines, Lincoln, Lowell, Phoenix, Sacramento).

Overall, the type of service offered may have much more of an effect on prioritizing trips by purpose than the actual, formal prioritization of those trip types itself.

Certification. Outside of eligibility, the certification process itself may operate as a ride-limiting factor either through stringent or bothersome requirements for documentation, or because access to certifiers is limited.

The clearest example of documentation as a barrier exists in Portland, where Title XX guidelines are used as the model for the establishment of overall eligibility. These guidelines require full income disclosure, and many of the more affluent applicants, as well as some of the poorer ones, are unwilling to comply. Unfortunately, the procedures were intended to screen out only the former.

Access to certifiers operates as a barrier most severely where certifying organizations are social service agencies (Des Moines). In such instances, non-agency-affiliated persons simply do not receive service. In other cases, ride-limitation is more subtle: agencies will certify all qualified users, affiliated or not, but they will only seek out and encourage enlistment of their own clients.

Trip Reservation Policies and Procedures. Trip reservation policies often embody other ride-limiting criteria, as, for example, the assigning of certain trip types to subscription versus demand-responsive service, or to only a certain day or hour.

More germane to the trip reservation process itself are procedures and rules dictating when a reservation may be placed, how far in advance it must be requested or when the request will be confirmed or denied.

Reservations which must be placed as far as two weeks in advance (Broward County, Phoenix Red Cross) for certain types of service (i.e., subscription or demand-responsive) discourage not only numerous medical trips, but many social/ recreational trips as well. Generally, long advanced notice for subscription service is not a deterrent, but such notice is not practical for many demand-responsive trips.

Several communities also have cutoff times regarding how late in the day reservations may be called in (Baton Rouge, 3 p.m.; Columbus, 1 p.m.; Houston, 3 p.m.; Lincoln, 3 p.m.; Lowell, noon (suggested); Milwaukee (van providers only), 3 p.m.). These limitations thus extend the reservation lead time for trips which are needed for late in the following day (e.g., in Columbus, a trip needed for 8:30 p.m. Thursday must be scheduled before 1:00 p.m. on Wednesday-- 31-1/2 hours in advance). This situation is not too frequent, as the majority of systems with cutoff points do not provide evening service (Baton Rouge, Des Moines, Lincoln, Lowell), and thus, the common 24 hour advanced notice requirement is applicable to all trip types.

Finally, confirmation procedures are a deterrent to ridership, as many systems call back users later in the day to confirm trip requests (Columbus, Corpus Christi, San Bernardino) or days later (Boston, 48 hours before the requested trip; Sacramento, the afternoon prior to the trip, and Syracuse, after the schedule has been completed for the day of the requested trip).

System Reliability. When wait times have a wide margin of error (Broward County, San Bernardino), the service is not useful for certain trip needs (e.g., medical appointments) unless the user is willing to arrive considerably early as a safety margin. A few systems with long wait times acknowledge this reality and agree to pick up the user within an hour of his or her scheduled appointment time--thus guaranteeing arrival time but making no commitments otherwise with regard to ride or wait times (Portland). A few systems (mostly small ones) soften the impacts of such a policy, or on wait times in general, by telephoning the user immediately before the pick-up (Lowell, Portland). And some even inform the users about what kind of vehicle (lift- or non-lift-equipped) will pick them up (Tulsa). Regardless, uncertainty about wait and ride times makes traveling difficult.

This uncertainty of pick-up and ride times is exacerbated by two other common system problems. One is the confirmation procedure whereby a user is often not notified until the day before the requested trip date whether or not the trip will be accommodated (Boston, Sacramento, Syracuse). The other is the practice whereby all users (except in the case of subscription trips) must telephone in at the conclusion of their appointments to arrange for the return trip (Portland, Tulsa), regardless of whether or not their return times are already known. Waits of an hour or two from this point are not uncommon.

Accessibility Barriers

Several system characteristics operate as ride-limiting factors by making it difficult or impossible for many riders to get from their homes to the vehicles, and onto them.

Level Changes Accommodated. Whether a system is door-to-door or curb-to-curb is one of the most important choices in all of special paratransit service. Yet, the decision has commonly been made almost as an afterthought.

The basic level change decision (i.e., door-to-door or curb-to-curb) has its most pronounced and sweeping impacts on ridership in cities that experience severe, prolonged winters (Boston, Des Moines, Lincoln, Portland, Lowell, Syracuse, Milwaukee). During winter months, when the ground is often covered by ice and snow, many handicapped persons cannot negotiate the trip from their doorstep to the vehicle. Many others, particularly the Elderly, who can, don't want to risk falling. Thus, unless the service is door-to-door (only Des Moines and Portland, of the cities mentioned above, are door-to-door), these would-be riders cannot use the system during winter months.

Compounding the impacts of winter is the fact that handicapped persons often live in multi-story buildings, and cannot negotiate the steps within the dwelling without assistance. The problem is its most severe in older, eastern cities, where vertical development is great and where elevators do not exist in many older buildings. An estimated 50 percent of Boston's handicapped persons cannot take advantage of its curb-to-curb service primarily for this reason.

Lack of Attendants. For some handicapped individuals, even the assistance of the driver is inadequate: another attendant is needed. This is particularly true where occupied wheelchairs must be moved up or down flights of stairs, or even off porches. In San Bernardino, a special escort belonging to the Retired Senior Volunteer Program (RSVP) is dispatched and interfaces with the service vehicle at the pick-up and (if needed) drop-off point. In Portland, Maine, a second vehicle deadheads to the pick-up or drop-off point and the second driver functions as a co-attendant. Yet, in general, the user is required to provide the escort or attendant. Where he or she does not--or where service is curb-to-curb and the user cannot provide even a sole attendant--he or she cannot use the system. (For this reason, systems almost universally charge attendants only the same low fares as the prime user for the trip, and some charge attendants nothing.)

Lack of Training. Special training is generally considered essential to the handling of elderly and handicapped persons, and as a result, sensitivity training and cardiopulmonary resuscitation (CPR) are basic elements of almost every paratransit system's driver training program (exceptions are taxi operations and those services run by volunteer drivers, like the Phoenix Red Cross). This recognition of the need for special training is mirrored by many state laws and insurance regulations.

A few communities also feel that special training is required for the handling of special types of handicapped persons. For example, Tucson's Handicar operation, which serves only wheelchair users, has a training program which includes every driver spending one full day per year in a wheelchair. Communities which cannot or choose not to provide such training commonly exclude those with specific handicaps from service, as Orange County and Milwaukee have excluded the Mentally Retarded. Because the lack of training often translates into other ride-limiting policies (e.g., eligibility restrictions), it is sometimes difficult to recognize it as a ride-limiting factor -- just as it is difficult to pinpoint many other ride-limiting factors as a consequence of the complex interrelationships among various system elements (e.g., insurance, level changes, work rules, training and eligibility).

Ride-Related Barriers

Many characteristics of the ride itself, relating to the vehicle, equipment, fellow passengers, drivers and fares, limit the ability of would-be riders to use the system even when they are eligible and can get to the vehicle.

Vehicle Design and Performance. In addition to the lack of lifts or ramps, many vehicle characteristics operate as ride-limiting factors. Often, the bottom step is too high for easy entry without assistance (Lincoln's GMC and Ford vans), or the roofs are too low, impeding entry for those who have trouble bending or stooping (Broward County).*

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*Certain companies, notably Dodge, make "high-rise" vans specifically for this reason. Roll bars encased in the roofs are optional (Boston).

Movement inside the vehicle is an entirely different problem. Some seating arrangements, such as perimeter seating, allow for easy movement within the vehicle, yet require some passengers to ride sidewards, sliding uncomfortably with each stop and start. Row seating is capable of accommodating more passengers, but movement inside the vehicle, particularly to rear seats, is difficult for many users. The severely handicapped are often unable to reach any but the front seats.

Whether the van is rear- or side-loading is another important choice. Rear-loading vans have tie-downs located to the back of the driver and "shot-gun" seats, necessitating wheelchair users to ride backwards. Many cannot handle this type of motion and become nauseous. Side-loading vehicles have removed the "shotgun" seat, and use the right front door for loading ambulatory passengers, rather than having them step through or use the lift.

Some system officials (Boston) believe in the extensive use of safety bars throughout the vehicle interior, enabling easy negotiation within the vehicle. Most systems, however, feel that these bars are either unnecessary or dangerous, and that passengers can use the backs of seats to negotiate from one to the next. None seems to employ the types of hand rails common to line haul buses (i.e., outlining and extending somewhat beyond the seat contours).

Finally, apart from design, poor suspension systems may operate as severe ride-limiting factors, particularly where streets are in poor condition (most winter cities) or where cobblestones are in place (Boston). This problem is inseparable from that of street conditions in general.

What makes the elimination of vehicle design constraints as ride-limiting factors so difficult is the fact that not only are different kinds of handicapped persons impeded by different kinds of barriers, but even individuals with virtually identical handicaps respond differently to the same design features (e.g., tie-downs requiring one to ride backwards). Because tailoring different vehicles' design features to different user needs cuts down on flexibility, system officials generally try to make choices, whenever possible, which either avoid the severest hardships on those most likely to be affected, or which would adversely affect the smallest number of riders in general. Because users so commonly have been left out of this decision-making area, choices made in many cities have been less than satisfactory.

Equipment. Only three pieces of equipment act as significant ride-limiting factors: lifts, tie-downs and air conditioning units.

Lift technology is an embarassment to Twentieth Century engineering. Not only do lifts break down constantly, but their design features make them unusable in many cases even when they function properly. Some don't have reliable safety bars, or safety bars at all, to keep wheelchairs from rolling off (Des Moines); technicians have had to redesign them. And some lifts have a 400 pound weight limit which often exceeds the combined weight of the driver-passenger-chair combination which must use it.

Tie-downs have been an enigma to numerous systems, primarily because many of them are not designed to accommodate electric wheelchairs--thus excluding quadraplegics and other severely handicapped persons from using the service (Columbus, Des Moines, Houston, Lincoln, Portland, Sacramento). Furthermore, some tie-downs bend wheelchair spokes and axles (Lincoln).

Air conditioning is felt to be important even by young, strong persons who often shun transit without it. Elderly and handicapped persons often cannot ride in hot weather without it. Because of this, most systems try to keep all units operational at all costs. But in systems with few or no spares, vehicles may not be pulled from service immediately, and a few users encountering warm or hot vehicles must decline service. Air conditioning is of such major importance in Broward County that system officials are slowly phasing out vans and phasing in minibuses primarily because of the superiority of the latter's air conditioning units.

Crowding. Crowding is a minor problem in a few systems where demand for peak hour service is great (Tucson). Because excessive ride-times operate as ride-limiting factors long before most vehicles are full (except in the case of group subscription trips), this problem is rare. Systems which have high load factors in small vehicles (San Bernardino's sedan-based Dial-A-Ride) occasionally encounter situations where no space is available. But the user is prevented from entering rather than stuffed into the vehicle (Checker sedans have two jump seats, and can become fairly crowded when occupied by seven passengers plus the driver). Standees are not compatible with Special paratransit service.

Attitudes. To a small degree, attitudes are a problem in every system. Oftentimes, complaints about rude reservation clerks merely reflect the clerks' efforts to curtail a seemingly endless, irrelevant conversation, or the refusal to act on a complaint such as "My vehicle was supposed to be here five minutes ago!" or "Why must so many others be picked up and dropped off on my trip?" Sometimes patience wears thin, and gruff dialogues occur. Because users so seldom have recourse even when they deserve it, they may choose to avoid the service.

Driver-related problems are rare. Complaints about refusals of assitance are common in curb-to-curb operations, when drivers are not required to provide such assistance, or even prohibited from doing so for insurance-related reasons. Adequately trained or not, most special paratransit drivers have a strong personal interest in helping their passengers, and bad driver attitudes are rare. In union-run systems, where drivers bid on paratransit service amid line haul runs, on a seniority basis, paratransit service is chosen early in the selection process.

Fares. Fares may become ride-limiting factors where they are excessive because of transfers or zones on long trips.

Modular systems (Orange County, San Bernardino) or zonal ones often charge by the module or zone. (Orange County and San Bernardino also require physical transfers at each boundary.) Those taking long trips often pay several base fares. In most cases, particularly Orange County, this constraint is deliberate; rather than travel by this method, users are encouraged to transfer to line haul. As Orange County's Dial-A-Lift for handicapped people is County-wide, only elderly people must undergo this inconvenience.

In systems where actual trip costs are based on distance (Milwaukee), users are sometimes charged an additional fare in excess of a certain amount, in addition to a base fare. In such cases, long trips -- particularly work and school trips, which must be made 10 times per week -- are unfeasible. Milwaukee recognized this system flaw, and introduced a hardship provision to limit the user's overcharges to $10. per two week period -- as long as the trip is for work (for-pay), school (for-credit) or medical appointment.

COMMUNITY IMPACTS

The impacts of special paratransit systems on non-users and communities in general have been minor and often invisible. Most fleets are so small as to go practically unnoticed in medium-sized or large metropolitan areas. Nevertheless, a few communities have felt subtle positive impacts from their systems.

Employment. Several systems provide a large number of work trips:

-- Boston -- 41.3%;

-- Columbus -- 56%;

-- Houston -- Most trips are for either medical or work purposes;

-- Lincoln -- 25%, and

-- Lowell -- 31.6%.

From a community standpoint, the employment of hundreds of handicapped persons not only contributes to the local tax base but also removes hundreds of otherwise permanent enlistees from the welfare rolls.

Business. Several communities focus much of their service on shopping trips, primarily for the Elderly:

-- Baton Rouge -- 36.6% of all trips;

-- Des Moines -- 10%

-- Milwaukee -- 9%

-- Portland -- 22%

-- Tucson -- 11%, and

-- Tulsa -- 33%.

Major impacts are illusory. And because of their generally lower prices, supermarkets have benefitted from this experience in comparison to small, generally more expensive, neighborhood stores. Impacts have been significant enough for markets in a few communities (Portland) to assign an assistant to help load bags onto the vehicles. In Phoenix, one large supermarket chain (Frye's) actually has a formal Handicapped Assistance Program: attendants meet the customers and assist them in their shopping.

Private Enterprise. Where paratransit service has been contracted out, it has stimulated private providers and has led to the emergence of new companies (Milwaukee).

Evidence of special service's positive impacts on the taxicab business can be found in the fact that drivers volunteer from among the regular taxi company labor force, primarily because special service pays better even without the tips. And the emergence and growth of companies involved in special paratransit service has occurred while, simultaneously, many of those not involved in such service have folded.

Most of the economic potential to private providers has not yet been realized because few have been able to integrate their special service operations into other services they provide. When this happens, economies of scale should emerge which will benefit users, companies and the community alike.

Facilitation of Social Service Programs. While many social service programs have or have had their own transportation components, large community-wide paratransit programs have been able to deliver far more clients to program facilities than the fragmented, autonomous agency-operated programs of the past (Lowell's Roadrunner literally quadrupled the ridership of its predecessor with the same fleet). As a result, those funds have become available for program use. Occasionally this reality has been abused. In Tucson, social service agencies have "dumped" their clients on the city-operated service and reallocated former transportation funds to other program categories. The facilitation of these programs has perhaps been special paratransit's greatest impact.

Community Image. Where special services are more visible -- in smaller communities, or where large, well-marked fleets circulate often in downtown areas -- the community image in general has experienced a boost: many non-users gain a sense that their community is really helping its handicapped and elderly members. Such an attitude is particularly strong in cities like Lincoln and Tulsa which have done many other things for handicapped and elderly persons. It is impossible to place a value on this impact, or to further define it or quantify it.

CONCLUSIONS

It should be apparent from the above that almost every system choice may serve as a ride-limiting factor of some kind. Because of the tradeoffs between efficiency and effectiveness with respect to different user groups, and because the most severely handicapped are the most difficult and costly to transport, these persons generally have suffered the most from ride-limiting factors. System officials and community members may want to keep this reality in mind in making design or planning decisions.

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CHAPTER V: SYSTEM IMPACTS

INTRODUCTION

Measuring the performance of the delivery of service as opposed to the production of goods has always been difficult. Because of differences in line haul service from community to community, it took the transit industry until late 1977 to officially condone the cautious and limited comparison of performance indicators from one system to the next.* By comparison, paratransit systems are even more dissimilar from city to city than line haul systems. As a consequence, the comparison of paratransit indicators is even more limited, and the results more tenuous.

Difficulties in Measuring Performance

Several factors immediately constrain the validity and use of performance indicator values with respect to paratransit service.

Multiplicity of Interrelated Factors. Performance is affected by so many different and interrelated factors that, in most cases, it is virtually impossible to determine which factors are responsible for which specific indicator values, and to what extent. Thus, the examination of performance is generally limited either to qualitative analysis or to broad interpretations of quantitative correlations like those presented in this Chapter.

Hidden Costs. All of the functions performed in the planning and operation of paratransit systems are not universally included in the calculation of operating costs. This is particularly true where non-operating agencies are heavily involved. For example, an outside community agency may perform certification, client referral and marketing (Lincoln), and as a result, the cost of that agency's time, and of performing those vital functions, is not included in cost per hour, per mile or per passenger trip figures. Or the transit agency, serving as both lead and operating agency, may split some functions among several staff members (Syracuse) or may have certain staff members split their time between paratransit and line haul operations (planners in Des Moines and Tulsa; dispatchers in Lincoln). Often, this staff may charge its time altogether to line haul operations. Directors of paratransit service who work primarily in line haul operations rarely charge time to the former. In Syracuse, upper management actually rotates its paratransit responsibilities. And where MPOs are heavily involved in planning and monitoring (Broward County, Lowell), their staff time is rarely reflected in cost figures.

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*The policy Board of the American Public Transit Association (APTA) passed a formal resolution to this effect in October, 1977 in response to discussions at the National Conference on Transit Performance (September 19-21, 1977).

Inconsistent Definitions. The definitions of many basic terms are not consistent from system to system, or even among various employees in the same operation. "Passenger-trip" is perhaps the most variable of these terms, although definitions of average trip time and trip length vary greatly--largely because some systems calculate them on the basis of vehicle miles (which include idle and deadhead time), and some on the basis of passenger miles. Many systems include driver lunch breaks as time during which vehicles are deployed.

The most misleading and confusing problem, by far, is the practice some systems have of counting all return trips as a separate type of trip--rather than the counterpart of the front end trip of the same type. Systems following this practice generally provide a large number of "triangle" trips (i.e., three-legged round trips: point A to B, B to C, and C to A). Not knowing which of the first two trip portions to attribute the return trip to, system officials create an entirely separate category for it. As a result, figures regarding trip types (e.g., as a percentage of all trips) are ambiguous, and not comparable with any other system's figures.

Vehicle Ownership and Leasing Arrangements. Some lead agencies own the vehicles, loaning them to operating agencies free-of-charge (Boston, Orange County), and sometime figuring depreciation into operating costs. Other systems lease the vehicles, either from the operating agency (Lowell, Broward County Handicab, Tucson) or from other sources. And still others simply include vehicle purchase and depreciation in the calculation of provider rates, where they appear as operating costs (San Bernardino, Houston, Milwaukee).

In a few cases, leasing arrangements are separate and highly unusual:

-- Tulsa's Elderly and Handicapped Transportation (EHT) program, run by an office within the transit agency, "leases" vehicles from the line haul operation at a rate of $16.50 per hour for minibuses, or $18.00 per hour for full size buses. The "leasing" fee includes the driver, maintenance, training, fuel and all non-administrative costs. Actual costs for these vehicles average $19.00 per hour; the difference is absorbed by the line haul portion of the transit operating budget;

-- Columbus' contract provider is paid on a per hour basis by the lead agency transit authority, but "leases" vehicles from the transit agency at the rate of 5¢ per mile.

These distinctions in ownership and leasing arrangements account for a good deal of operating costs, if considered as such. Yet, as systems treat such arrangements so inconsistently, comparisons of performance are often sloppy and unreliable.

Failure to Gather Useful Effectiveness Data. Few systems record odometer readings or log in the exact hour and minute at every pick-up and drop-off point (Tucson, Broward County SST). As a result, most effectiveness data are based on mere guesses--which are somewhat more accurate when made by drivers. Because efficiency must be viewed in the context of the effectiveness it yields, the lack of accurate data in one area affects the ability to find meaning in the other.

Misleading Concepts. Two notions commonly used to describe performance can project misleading ideas about performance.

The most glaring of these misconceptions is the "rejection rate," signifying the percentage of trip requests not accomodated, and used as a proxy for "percentage of demand not met." To begin with, most requests are refused because the service policies do not allow their accommodation (i.e., eligibility). In such cases, the request is not made again. Yet even in cases where trip requests are legitimate, after two or three rejections the user is unlikely to call again, preferring to drop out of the system rather than experience repeated frustration. Because of this tendency, the rejection rate does not really illustrate how much demand is being met.

Another often illusory notion is that of average wait time. The variations in operating policy in this area are endless. Some systems ask that users be ready one hour in advance of the pick-up, and count the time from one hour before the request to the pick-up as wait time. Other systems telephone the user immediately before the vehicle arrives, and thus, do not count the time the user spends, ready to go, awaiting the last minute telephone call. Often, wait times are calculated only on the basis of wait times for front end trips (or "outs," as they are sometimes called), while wait times for return trips are much longer. And finally, for many subscription trips, the whole notion of wait times does not apply. Since each trip is scheduled for the exact same time slot each day it is provided, and since riders are generally picked up and dropped off in the same sequence each day, they quickly learn to estimate vehicle arrival times within a few minutes. As for the return trip, the users are often engaged in activities at the destination until the vehicle arrives, on the minute in some cases. Thus, there is often virtually no wait time at all. In other cases, however, particularly with nutrition trips, users must sit around for hours while the vehicles complete their mid-day, off-peak runs before returning to take their nutrition riders home. In Broward County, nutrition trips begin mid-morning, while return pick-ups are not made until mid-afternoon. Combined ride and wait times--especially for those picked up early and dropped off late in the sequence--can be extremely long.

Given these problems and characteristics, it is easy to understand why the precise comparison of system impacts is not possible. Rather, indicator values serve as clues to how performance is affected by different factors. Thus, indicator values in themselves rarely can be used to comment on a system's competence or management.

Balancing Efficiency and Effectiveness

One of the least understood yet critically important relationships in paratransit operations is that between efficiency and effectiveness. In line haul operations--which have provided the bulk of transportation experience for many paratransit operators--improvements in efficiency and effectiveness often go hand in hand. With routes and stops fixed, increases in load factors generally result in only minor increases in ride time. When ride times increase significantly, they are usually offset by the deployment of additional vehicles, and a resultant decrease in headway. The system takes in more revenue and carries more passengers per mile or hour, and the user gets more frequent service.

Paratransit service operates very differently with respect to efficiency and effectiveness. Each additional passenger carried increases the ride and wait times for existing passengers. These incremental increases are only minor where densities are high, origins and destinations limited, pairings common to groups of passengers, service highly pre-scheduled, and the service area fairly small. But this scenario is rare. Instead, the tradeoffs between efficiency and effectiveness operate very much like a seesaw: as one end goes up the other goes down. When load factors increase, efficiency values generally improve; costs per passenger trip, per hour and per mile go up. At the same time, wait and ride times increase, and on-time performance becomes less reliable.

The inescapable reality of the above is that, to a point, efficiency and effectiveness values can be set any way a community wants them to be set. The tools with which the community can basically dial the exact position of the seesaw it wants are its basic system choices.

As an illustration, in order to improve efficiency, a community or system might: (1) emphasize subscription service; (2) limit destinations; (3) focus largely on group trips; (4) use large vehicles, maximizing loadings; (5) limit the service area; (6) restrict operating hours; (7) charge high fares; (8) emphasize service to elderly persons, and (9) use inexpensive labor. Because of the interrelationships among the various system choices, and the mutual exclusivity of many of them, this exact mix of choices is rarely possible. But Tulsa, using choices (1) through (6) above, has been able to provide almost 11 passenger trips per hour. Of course, the bulk of the service is available only to a limited number of persons, at certain times of day, to a few restricted destinations, and with often long and uncertain ride and wait times.

At the other extreme, a system can choose to: (1) extend eligibility to the general public; (2) provide immediate-response service to everyone; (3) cover the entire service area without a transfer; (4) saturate the service area with vehicles, and (5) serve every destination and trip purpose in the service area 365 days a year. The Phoenix-Mesa Shared Ride Taxi operation has done this. It has been able to serve 90 percent of trips requested within 30 minutes of the call-in time, and with ride times of less than 30 minutes. And using 21 vehicles within a 45 square mile service area, it has been able to provide almost four passenger trips per hour, at a cost per passenger trip of $3.50.* Orange County, on the other hand, transporting handicapped people, without a transfer, to any point within 420 miles of a larger 768 square mile service area with 10 deployed vehicles, 365 days a year, has been able to provide only 1.6 passenger trips per hour, at a cost of $14.42 per trip. Wages, contract rates and fares are similar for both systems.

TRADITIONAL MEASURES OF PERFORMANCE

The previous section of this Chpater has shown that performance indicators contain margins of error which limit their comparability, and that indicator values basically reflect choices about the kind and amount of service which a community has decided to provide. Such indicators, then, tell us little about how well a system is managed. And clearly, the notions of "good" or "bad" have no meaning in the context of such indicators.

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*The Mesa service area was expanded to approximately 80 square miles shortly after the site visit.

Despite these limitations, performance indicators are useful, when viewed in the proper context, in that they help to describe the type of service delivered. In addition, the comparison of indicator values among several cities helps to explain the consequences of various system choices.

The following tables contain the basic system characteristics of the 30 systems examined in this Project, and should be taken into consideration in subsequent discussions about performance. For a more thorough understanding of certain points, it is suggested that the reader consult the 18 case studies which serve as an Appendix to this Manual.

BEST DOCUMENT AVAILABLE

LOGISTICAL FACTORS

SYSTEM	SERVICE AREA*	NUMBER OF VEHICLES	ELIGIBILITY				WEATHER/CLIMATE	
			Hand.	Elderly	Low Income	General Public	cold Winter	hot Summer
Baton Rouge	88	9	X					X
Boston	22	16	X				X	
Broward County (SST)	400	15	X	X	X			X
Broward " (Handicab)	400	unlim.	X					X
Columbus	531	6	X	X				
Corpus Christi	106	9	X	X				X
Des Moines	578	11	X	X	X		X	
Houston	300	21	X	X	X			X
Lincoln	843(52)	8	X				X	
Lowell	15+	4	X				X	
Milwaukee	242	unlim.	X				X	
Orange County (DAL)	420**	20	X					X
Orange " (Fun Bus DAR)	N.A.***	20	X	X	X	X		X
Orange " (Yellow Cab DAR)	N.A.	unlim.	X	X	X	X		X
Phoenix Dial-A-Ride	168	17	X	X				X
Phoenix Red Cross	1200±	17	X	X				X
Phoenix-Mesa	45****	21	X	X	X	X		X
Portland, Me.	860(22)	11	X	X	X		X	
Sacramento (Careful Coach)	389	6	X	X				
Sacramento (Paratransit, Inc.)	389	6	X	X				
San Bernardino (Holy D DAR)	N.A.	3	X	X	X	X		X
San Bern. (Yellow-Che DAR)	N.A.	unlim.	X	X	X	X		X
San Bern. (Paul's DAR)	N.A.	15	X	X	X	X		X
San Bern. (Holy D DAL)	N.A.	5	X					X
San Bern. (Paul's DAL)	N.A.	4	X					X
San Bern. (Yel-Chek. DAL)	N.A.	4	X					X
Syracuse	785(35)	5	X	X			X	
Tucson (SVTS)	98	31	X					X
Tucson (Handi-Car)	98	32	X					X
Tulsa	50	7	X	X				X

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*Service areas are noted in square miles. Numbers in parentheses are designated "inner zone" portions of the overall service area which receive more concentrated service.

**The service can technically operate within the 768 square miles of Orange County, but only 420 miles of the County expresses a need for service.

***N.A. indicates "not available".

****Enlarged to 80 square miles shortly after the site visit.

BEST DOCUMENT AVAILABLE

OPERATIONAL FACTORS

SYSTEM	SERVICE CONCEPT	DEPLOYMENT deployed	DEPLOYMENT spares	OPERATING HOURS weekdays	OPERATING HOURS evenings	OPERATING HOURS weekends	OPERATING HOURS holidays
Baton Rouge	zones	6	3	X			
Boston	no zones, small service area	11	5	X	X	X	
Broward County ([illegible])	zones	44	7	X			
Broward " (Handicab)	no zones, large service area	5	unlim.	X			
Columbus	no zones, large service area	5	1	X			
Corpus Christi	zones	7	1	X			
Des Moines	no zones, large service area	11	0	X		X	
Houston	no zones, large service area	19	2	X		X	
Lincoln	inner-outer zones	7	1	X			
Lowell	no zones, small service area	3	1	X		X	
Milwaukee	no zones, large service area	unlim.	unlim.	X	X	X	X
Orange County (Dial-A-Lift)	no zones, large service area	10	10	X	X	X	X
Orange County (Fun Bus DAR)	modules	10	10	X		(Sat.)	
Orange County (Yellow DAR)	modules	unlim.	unlim.	X		(Sat.)	
Phoenix Dial-A-Ride	zones	17	0	X			
Phoenix Red Cross	no zones, large service area	17	0	X			
Phoenix-Mesa	no zones, small service area	21	unlim.	X	X	X	X
Portland	inner-outer zones	11	0	X			
Sacramento (Careful Coach)	no zones, large service area	5	1	X	X	(Sat.)	
Sacramento (Paratransit Inc.)	no zones, large service area	5	1	X			
San Bernardino (Holy D. DAR)	modules	2	1	X			
San Bernardino (Yel-Chek DAR)	modules	14	unlim.				
San Bernardino (Paul's DAR)	modules	13	2	X			
San Bernardino (Holy D. DAL)	no zones, large service area	4	1	X			
San Bernardino (Yel-Chek DAL)	no zones, large service area	4	0	X		X	
San Bernardino (Paul's DAL)	no zones, large service area	3	1	X		X	
Syracuse	inner-outer zones	5	0	X	X	X	X
Tucson (SMTS)	no zones, large service area	20	11	X	X	X	X
Tucson (Handi-Car)	no zones, large service area	32	unlim.	X	X	X	X
Tulsa	zones (but not rigidly followed)	6	1	x	(X)*		

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*Taxis provide occasional return trips for passengers stranded beyond normal operating hours.

BEST DOCUMENT AVAILABLE

OPERATIONAL FACTORS

SYSTEM	LEVELS ACCOMM.*	TYPE OF SERVICE**			GROUP TRIP FREQUEN.	TRIP TYPES SERVED (predominant)						
		Subsc.	PSDR	IR		med.	wk.	sch.	nutr.	SS.	so/rc	shp.
Baton Rouge	DD	X	X	(X)	low	X	X		X	X	X	X
Boston	CC	X	X	(X)	low	X	X	X			X	
Broward County (SST)	DD	X	X	(X)	high	X			X	X		X
Broward " (Handicab)	CC		X		low	X	X	X				
Columbus	CC	X	X		low	X	X	X				
Corpus Christi	CC	X	X	(X)	high	X			X			
Des Moines	DD	X	X		high	X	X		X	X		
Houston	CC	X	X	(X)	low	X	X					
Lincoln	CC	X	X	X	low	X	X	X			X	X
Lowell	CC	X	X	(X)	low	X	X			X	X	X
Milwaukee	CC	X	X	X	vans:hi cabs:low	X	X				X	X
Orange County DAL	CC	X	(X)	(X)	low				N.A.			
Orange County Fun Bus DAR	CC	X	X		low				N.A.			
Orange County Yellow DAR	CC			X	low				N.A.			
Phoenix Dial-A-Ride	DD	X	X	(X)	high				N.A.			
Phoenix Red Cross	DD	(X)	X		low				N.A.			
Phoenix-Mesa	CC		(X)	X	low				N.A.			
Portland	DD	X	X	(X)	high	X	X		X	X		X
Sacramento (Careful Coach)	DD	X	X	(X)	medium	X	X	X			X	X
Sacramento (Paratransit Inc.)	CC	X	X	(X)	medium	X	X	X			X	X
San Bernardino (Holy D. DAR)	CC			X	low				N.A.			
San Bernardino (Yel-Chek DAR)	CC	(X)	(X)	X	low				N.A.			
San Bernardino (Paul's DAR)	CC	(X)	(X)	X	low				N.A.			
San Bernardino (Holy D. DAL)	CC	X	X	(X)	low				N.A.			
San Bernardino (Yel-Chek DAL)	CC	X	X	(X)	low				N.A.			
San Bernardino (Paul's DAL)	CC	X	X	X	low				N.A.			
Syracuse	CC	X	X	(X)	low	X	X		X	X	X	X
Tucson (SMTS)	DD	X	X***	X	low	X			X	X		X
Tucson (Handi-Car)	DD	X	X***	X	low	X			X	X		X
Tulsa	CC	X	X	X	high	X			X		X	X

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*DD indicates door-to-door service, CC indicates curb-to-curb service.

**PSDR indicates pre-scheduled demand-responsive service, IR indicates immediate-response service.

***Tucson's systems require only one or two hours advanced notice for pre-scheduled demand-responsive service; thus, much of their service resembles immediate-response service.

BEST DOCUMENT AVAILABLE

ECONOMIC/ADMINISTRATIVE FACTORS

SYSTEM*	DRIVER WAGE RATE	CONTRACT RATE	DRIVERS as % of STAFF	LEAD AGENCY	OPERATING AGENCY	FARE($)
Baton Rouge	$3.91	n/a**	60	SS	SS	45¢
Boston	$3.75-$5.25	cost	N.A.	TO	Pvt. NP	75¢
Broward County (SST)	$4.20-$5.30***	n/a	84	County	County	0
Broward County (Handicab)	$3.60	$16/hr(van) $13/hr(sed)	N.A.	County	Taxi	$1/zone
Columbus	$5.48	$15.49/hr	75	TO	Pvt. NP	60¢
Corpus Christi	$3.96-$4.10	n/a	58	TO	TO	35¢ or 0
Des Moines	$4-$4.95	$18/hr(van)	58	County	TO	0
Houston	$3.15-$5	$12-$14/hr	78	TO	Pvt. FP	50¢ to $1
Lincoln	$5.58-$6.20	n/a	80	TO	TO	40¢
Lowell	$4.05		59	TO	Pvt. FP	25¢ to $1
Milwaukee	$5-$6	per 1/5 mi. or block	N.A.	TO	Pvt. FP/Taxi	$1 plus overrun beyond $7
Orange County DAL	$3.50-$4.50	$16.80/hr	78	TO	Pvt. FP	50¢
Orange County (Fun Bus DAR)	$4-$4.75	$20.00/hr	79	TO	Pvt. FP	50¢ to $1
Orange County (Yellow DAR)	$4-$5.25	$12.80 to $20.00/hr	N.A.	TO	Taxi	50¢ to $1
Phoenix Dial-A-Ride	$5.75	n/a	77	City	City	0
Phoenix Red Cross	0	n/a	87	SS	SS	0
Phoenix-Mesa	$4.25	meter fare less user charge zone	93	City	Taxi	40¢ to $1
Portland	$3-$3.87	n/a	65	City	City	0
Sacramento (Careful Coach)	$7.99+	n/a	83	TO	TO	50¢
Sacramento (Paratransit Inc.)	$4.50-$5	$16.38/hr	55	TO	Pvt. NP	50¢
San Bernardino (Holy D. DAR)	$3.50	$12.75/hr	62	TO	Pvt. NP	$1
San Bernardino (Yel-Chek DAR)	$3.25-$3.75	$12.50/hr	77	TO	Taxi	35¢/zone
San Bernardino (Paul's DAR)	$2.90-$4	cost + 10%	72	TO	Taxi	50¢/zone
San B[illegible]dino (Holy [illegible] DAL)	$3.50	$12.25/hr	N.A.	TO	Pvt. NP	50¢/zone
San Bernardino (Yel-Chek DAL)	$3.25-$3.75	$12.50/hr	N.A.	TO	Taxi	35¢/zone
San Bernardino (Paul's DAL)	$2.90-$4	cost + 10%	N.A.	TO	Taxi	50¢/zone
Syracuse	$5.01-$6.20	N.A.	N.A.	TO	TO	50¢ to $1
Tucson (SNTS)	$5.69	N.A.	83	City	City	15¢ or 35¢
Tucson (Handi-Car)	$3.10-$3.77	$1.05/mi	75	City	Pvt. FP	15¢ or 35¢
Tulsa	$5.88	n/a	46	TO	TO	50¢ or 12 1/2¢

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* Abbreviations are as follows: SS, social service agency; Pvt. NP, private non-profit; Pvt. FP, private for-profit; TO, transit operator.

**n/a indicates "not applicable."

***Broward County's SST also employs 30 CETA trainees, earning $3.60 per hour.

Basic System Characteristics

Factors which affect performance may be grouped neatly into three categories:

-- Logistical Factors -- These involve where, to whom and with what the service will be delivered. Specific factors include:

- service area size;
- fleet size; age and type of vehicles;
- eligibility, and
- weather/climate/topography.

-- Operational Factors -- These involve when and how service is delivered. Specific factors include:

- service concept;
- operating hours;
- pre-scheduling format/type of service;
- level changes accommodated, and
- trip types served.

-- Economic/Administrative Factors -- These directly affect cost and revenue, and include:

- wage rates;
- contract rates;
- driver: non-driver ratio;
- lead and operating agency combinations, and
- fares.

Efficiency. Efficiency is a measure of the amount of service provided for a given amount of effort or resources. Indicators of efficiency commonly calculated include:

-- Cost per passenger trip;

-- Cost per mile;

-- Cost per hour;

-- Passenger trips per mile, and

-- Passenger trips per hour.

These indicators are affected by a majority of factors which influence performance:

Logistical Factors	cost per passenger trip	cost per hour	cost per mile	passenger trips per hour	passenger trips per mile
Service Area Size	X	X	X	X	X
Fleet Size, etc.	X	X	X	X	X
Eligibility	X	X	X	X	X
Weather/Climate/Topography	X	X	X	X	X
Operational Factors					
Service Concept	X	X	X	X	X
Operating Hours	X	X	X	X	X
Pre-Scheduling Format/ Type of Service	X	X	X	X	X
Level Changes Accommodated	X	X	X	X	X
Trip Types Served	X	X	X	X	X
Economic/Administrative Factors					
Wage Rates	X	X	X		
Contract Rates	X	X	X		
Driver: Non-Driver Ratio	X	X	X		
Lead and Operating Agencies	X	X	X		
Fares					

As the above chart illustrates, those factors which affect system efficiency tend to affect both cost-related and passenger utilization measures of efficiency in most cases. The exceptions are economic and administrative factors, which generally affect costs but have no direct impacts on how many passengers are carried. The one exception to this, from among the systems examined, may be Tulsa, where the transit agency, serving as both lead and operating agency, uses full size line haul vehicles for group trips. One might argue that the choice of the transit operator as operating agency made the availability of full size buses possible. On the other hand, Tulsa's EHT Office, a special "office-within-an-office," technically "leases" these vehicles from the main transit agency; there is nothing to stop other non-transit agency providers from obtaining a similar arrangement with the local transit agency. Along similar lines, there is nothing preventing transit agency providers from focusing on agency-affiliated clients (Des Moines).

The following chart contains efficiency indicator values for the 30 systems examined:

SYSTEM	COST PER PASSENGER TRIP	COST/ HOUR	COST/ MILE	PASSENGER TRIPS/HOUR	PASSENGER TRIPS/MILE
Baton Rouge	$ 4.00	$10.42	$ 1.23	2.6	.24
Boston	11.62	15.73	1.63	1.5	.14
Broward Cty. (SST)	4.37	14.87	1.30	3.4	.29
Broward Cty. (Handicab)	N.A.*	N.A.*	N.A.*	N.A.*	N.A.*
Columbus	13.69	15.52	1.30	1.13	.09
Corpus Christi	2.50	8.15	.82	3.26	N.A.
Des Moines	2.88	18.00	N.A.	3.1	N.A.
Houston	11.57	13.19	N.A.	1.14	.09
Lincoln	4.34	10.74	.79	2.5	.18
Lowell	3.78	15.60	1.06	4.13	.28
Milwaukee	8.12	N.A.	N.A.	n/a	n/a
Orange Cty. (DAL)	14.42	23.67	1.69	1.6	.11
Orange Cty. (Fun Bus DAR)	31.89	29.32	7.13	.9	.22
Orange Cty. (Yellow DAR)	80.42*	20.66*	5.97*	.2	.06
Phoenix DAR	2.17	9.45	.89	4.36	.41
Phoenix Red Cross	1.40	2.59	.22	1.84	.16
Phoenix-Mesa	3.50	13.33	1.07	3.81	.30
Portland	3.66	13.19	.95	3.60	.26
Sacramento (Careful Coach)	N.A.	N.A.	N.A.	N.A.	N.A.
Sacramento (Paratransit Inc.)	4.26	12.78	1.00	3.06	.18
San Bernardino (all systems)	3.46	12.08	.98	3.2	.28
Syracuse	3.00	11.40	1.20	3.6	.37
Tucson (SNTS)	4.43	14.70	1.23	3.32	N.A.
Tucson (Handi-car)	4.96	N.A.	1.04**	1.84	N.A.
Tulsa	1.95	20.95	N.A.	10.71	N.A.

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*This operation had been in existence for only one month at the time of the site visit.

**This figure is calculated on the basis of passenger miles, whereas all others are based on vehicle miles, which include deadhead time.

Effectiveness. Effectiveness measures the nature or quality of service delivered.

Of those factors which affect overall performance, a quite different subset influences effectiveness than influences efficiency. And most factors do not influence all effectiveness indicators uniformly:

PERFORMANCE CHARACTERISTICS	EFFECTIVENESS MEASURES					
	Average Wait Time	Average Ride Time	On-Time Performance	Cancellation/"No-Shows"/Rejections	Average Trip Length	Indicators of Load Factor
Logistical Factors --						
Service Area Size	X	X	X		X	X
Fleet Size	X	X	X		X	X
Eligibility		X		X	X	X
Weather/Climate/Topography				X		
Operational Factors --						
Service Concept	X	X	X	X	X	X
Operating Hours						X
Pre-Scheduling Format	X	X	X	X		X
Level Changes Accommodated		X				
Trip Types Served	X	X		X	X	X
Economic & Administrative Factors--						
Wage Rates						
Contract Rates						
Driver: Non-Driver Ratio						
Lead and Operating Agencies						
Fares						

Economic and administrative factors have no direct impacts whatsoever on effectiveness, whereas most other factors influence most aspects of effectiveness. Exceptions are weather/climate/topography, level changes accommodated and group trip frequency--all choices which affect one's eligibility or the feasibility of using the service at all, rather than the quality of the ride.

The following table contains effectiveness values for the systems examined. Trip lengths are actual calculations. Except for Tucson's SNTS, all ride and wait time figures are estimates by either system officials, drivers or Project Team members. (Systems without complete data are not listed.)

SYSTEM	AVERAGE WAIT TIME	AVERAGE RIDE TIME	AVERAGE TRIP LENGTH
Baton Rouge	5	N.A.	4.2
Boston	10	27	4
Broward County (SST)	45	90	N.A.
Columbus	N.A.	50	11
Corpus Christi	N.A.	N.A.	N.A.
Des Moines	9	16	N.A.
Houston	10	29	6.4
Lincoln	13	N.A.	7.15
Lowell	25	30	N.A.
Milwaukee	25 (taxis)	25 (taxis)	N.A.
Orange County Dial-A-Lift	15	15	N.A.
Orange County Dial-A-Ride (Fun Bus)	N.A.	N.A.	N.A.
Orange County Dial-A-Ride (Yellow Cab)	N.A.	N.A.	N.A.
Phoenix Dial-A-Ride	45	45	N.A.
Phoenix Red Cross Dial-A-Ride	N.A.	30-45	N.A.
Portland	60	60	25.1
Sacramento (Careful Coach)	N.A.	N.A.	N.A.
Sacramento (Paratransit Inc.)	5	17	5.5
San Bernardino (all systems)	60	20	N.A.
Syracuse	N.A.	16	4
Tucson (SNTS)	30	20	N.A.
Tucson (Handi-Car)	30	20	N.A.
Tulsa	30	30	N.A.

Financial Performance. Financial performance describes the relationship between revenues and costs which stems from the particular type and mix of service delivered. Its primary indicator is the operating ratio, measured simply as farebox revenue divided by costs.

Financial performance is affected by all factors which have a direct bearing on operating costs or revenues.

Operating ratios for the systems examined are as follows:

SYSTEM	OPERATING RATIO
Baton Rouge	.113
Boston	.09
Broward County (SST)	0
Broward County (Handicab)	N.A.*
Columbus	.03
Corpus Christi	N.A.
Des Moines	0
Houston	N.A.
Lincoln	.09
Lowell	.083
Milwaukee	.173
Orange County Dial-A-Lift	.02
Orange County (Fun Bus Dial-A-Ride)	.01
Orange County (Yellow Cab Dial-A-Ride)	.01*
Phoenix Dial-A-Ride	0
Phoenix Red Cross	0
Phoenix-Mesa	.17
Portland	0
Sacramento (Careful Coach)	N.A.
Sacramento (Paratransit, Inc.)	N.A.
San Bernardino (all systems)	.11
Syracuse	.10
Tucson (SNTS)	N.A.
Tucson (Handi-Car)	N.A.
Tulsa	.09

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*This system had been operating for only one month at the time of the site visit.

It is obvious that no systems recover more than a small fraction of their operating costs from the farebox. While the two systems examined which exhibit the highest operating ratios (Milwaukee and Phoenix-Mesa both achieve .17) charge high fares ($1.00 and 50¢)), there is little correlation between fares and operating ratios for most systems, except of course, where no fares are charged (and the operating ratio is zero). One can conclude from this that factors which affect costs have--except for cases at the extremes of the fare spectrum--more of an impact on operating ratio than those which affect fares.

FACTORS LIMITING PERFORMANCE

The remainder of this Chapter analyzes the effects of 14 specific operating variables on paratransit performance. The conclusions of this analysis are not at all what one might expect--particularly if one borrows assumptions from line haul experience.

As 65 to 80 percent of line haul operating costs are consumed by labor, wage rates, obviously, are the key variable in the calculation of cost-related line haul efficiency. And with a multi-stop operation, dwell times account for a significant portion of operating time. So one might assume that the provision of door-to-door service would consume hugh portions of each operating hour. However, when one carefully examines the factors which theoretically might affect paratransit performance, it becomes clear that neither wage rates nor level changes accommodated have any significant impact on performance.

This realization is important for two reasons. First, it points out just how great the difference between line haul and paratransit operations is. Unlike line haul operations, the factors which appear to influence paratransit performance are eligibility, service concept, pre-scheduling format/type of service, trip types served, contract rates and square miles per vehicle deployed -- all notions which either do not exist or which have no meaning in line haul operations. So great are these six determinants of performance that those factors which influence line haul performance -- wage rates, weather/climate/topography, driver to non-driver ratio, operating hours, fares -- have virtually no impact on paratransit performance. And in the particular case of wage rates, advantages gained from transit agency involvement (expertise, maintenance facilities, etc.) appear to compensate for the higher wages.

The second important conclusion that can be drawn from these realities is that paratransit is in an extremely early stage of its development. If routing changes in line haul service were able to effect differences in efficiency to a large extent, then the effects of wage rates would be far less in contrast. Yet, over line haul's half century evolution, routes, schedules and other system characteristics have become so refined that changes in these factors deliver only marginal benefits.* By contrast, the impacts of service concepts and factors related to group trip-making (eligibility, type of service, trip types served) have such enormous potential for affecting performance that variables like wage rates are negligible by comparison.

In the context of paratransit's youth as a technology, it should be clear that as the state-of-the-art develops, the conclusions of this analysis will become obsolete and incorrect. Once system designers have maximized those factors which now make tremendous differences in performance, once efficiency has been fine-tuned within the tolerable limits of a community's effectiveness standards, then wage rates and other factors currently of little importance may become more significant.

The subsequent analysis has its value in identifying those factors whose manipulation can, at present, deliver the biggest gains in performance. It is hoped that communities and service providers will take a close look at these factors in designing or changing their systems--at least until all the possibilities for improvement in these areas are exhausted.

Logistical Factors

The basic dimensions of supply and demand--service area size, type of persons served, fleet size and the physical and environmental characteristics of the service area (weather, climate, topography)--affect all three basic components of performance: efficiency, effectiveness and financial performance.

Service Area Size. If all trips were neighborhood-oriented, service area size would have no impact on performance, given equal user densities and fleet sizes. But two factors upset this neat little model.

The first problem is that trip needs are not neighborhood-oriented. Rather, the majority of desirable destinations are centrally-located. And the larger the service area, the fewer of these destinations there are per square mile (e.g., the biggest counties usually have only one county hospital).

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*For example, the installation of RUCUS, a computerized run-cutting and scheduling tool, can deliver only an estimated two to four percent increase in efficiency.

From the viewpoint of the facilities or destinations, economies of scale are possible by centralizing facilities within large service areas. But from a transportation viewpoint, the larger the service area, the longer the average trip length, the fewer persons who can be served per unit of time, and the greater the costs of serving each one.

Fortunately, as service area size increases, two major factors tend to offset the decrease in efficiency, making it decrease at a slower rate than the increase in service area size. The first of these is the fact that patterns of residential density tend to be heaviest near the center of the service area, where the majority of destinations also happen to be. The other major factor is that, in practice, fleet size does not mirror the differences in service area size from city to city. Rather, the largest service areas often contain the fewest vehicles per square mile (or conversely, the greatest number of square miles to cover per vehicle):

SYSTEM	SERVICE ARE (in square miles)	VEHICLES DEPLOYED	SQUARE MILES/ VEHICLE DEPLOYED
Boston	22	11	2.0
Lowell	15*	3	5.0+
Phoenix-Mesa	45**	21	2.1
Tulsa	50	6	8.3
Baton Rouge	88	6	14.7
Tucson (SNTS)	98	20	4.9
Tucson (Handi-Car)	98	32	3.1
Corpus Christi	106	7***	13.2
Phoenix Dial-A-Ride	168	17	9.9
Milwaukee	242	unlim.	N.A.
Houston	300	19	15.8
Sacramento (Careful Coach)	389	5	77.8

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*In addition, trips to downtown Boston are provided.

**This service area was expanded to 80 square miles shortly after the Project site visit.

***Four of the seven deployed vehicles deliver meals to "shut-ins" during the mid-day off-peak period.

Sacramento (Paratransit Inc.)	389	5	77.8
Broward County (SST)	400±	44	9.1
Orange County Dial-A-Lift	420*	10	42
Columbus	531	5	106.2
Des Moines	578	11	52.5
San Bernardino Dial-A-Lifts (3)	600±	11	54.5
Syracuse	785	5	157
Lincoln	843	7	120
Portland	860	11	78
Phoenix Red Cross	1200	16**	75

Of the 30 systems and 18 communities examined, only Syracuse, Lincoln and Portland employ inner-outer zone service concepts. These three cities are among those with the largest number of square miles covered per vehicle, and have three of the largest service areas. This suggests that when a service area approaches unmanageable proportions with respect to the fleet's ability to serve it, system officials have opted to concentrate service in the most densely populated areas. By so doing, the square miles covered per vehicle deployed have decreased enormously in those portions of the service areas most heavily served (i.e., the inner zones):

CITY	SERVICE AREA INNER ZONE	VEHICLES DEPLOYED IN INNER ZONE	SQUARE MILES PER VEHICLE DEPLOYED (inner zone)
Syracuse	35	4	8.7
Lincoln	52	6	8.7
Portland	22	9 ***	2.4***

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*Phoenix Red Cross actually deploys 17 vehicles, but one is used exclusively to carry supplies to nutrition sites.

**These 420 square miles lie within a larger 768 square mile area, the remainder of which is unpopulated.

***Of these nine vehicles, six provide subscription service to an from outer zone sectors during the a.m. and p.m. peaks. Thus, they cover the inner zone only about half of the time. As a consequence, a truer figure might be about five square miles per vehicle deployed.

With respect to their inner zone coverage rates, Lincoln, Portland and Syracuse are among the best served in terms of square miles per vehicle deployed. The fact that only communities with extremely large service areas have chosen such a concept illustrates how pragmatic communities are, and at the same time, how resistant they are to employ a concept of service other than mere randomness unless such an appraoch is unavoidable by virtue of otherwise intolerable inefficiency and ineffectiveness.

Common sense tells us that, all other things equal, service area size should have a profound effect on efficiency, effectiveness and financial performance. Yet, to repeat once again, all other things are not equal in paratransit, and as a result, an examination of performance indicator values with respect to differences in service area size reveals no correlation whatsoever between the two. Systems without these data are not shown:

SYSTEM	SERVICE AREA (in square miles)	PASSENGER TRIPS/HOUR	AVERAGE RIDE TIME	OPERATING RATIO
Boston	22	1.5	27	.09
Lowell	15+	4.13	30	.083
Pheonix-Mesa	45	3.81	13	.17
Tulsa	50	10.71	30	.09
Baton Rouge	88	2.6	90-120	.113
Tucson (SNTS)	98	3.32	20	N.A.
Tucson (Handi-car)	98	1.84	20	N.A.
Corpus Christi	106	3.26	N.A.	N.A.
Phoenix Dial-A-Ride	168	4.36	45	0
Milwaukee	242	N.A.	N.A.	.173
Houston	300	1.14	29	N.A.
Sacramento (Paratransit Inc.)	389	3.06	17	N.A.
Broward County (SST)	400±	3.4	90-120	0
Orange County Dial-A-Lift	420*	1.6	15	.02
Columbus	531	1.13	50	.03
Des Moines	578	3.1	16	0
San Bernardino (all six systems)	600±	3.2	20	.11
Syracuse	785	3.6	16	.10
Lincoln	843	2.5	N.A.	.09
Portland	860	3.6	60	0
Phoenix Red Cross	1200±	1.84	30-45	0

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*This area lies within a larger 768 square mile area, the bulk of which is unpopulated.

What explains this lack of correlation is the fact that other factors have much greater impacts on performance, taken together, than service area size, thus rendering the effect of service area size alone negligible. This should be encouraging to those systems with large service areas. Yet at the same time, the fact that service area size is not a factor illustrates, on one hand, how ill-conceived many system designs must be, and on the other, how much potential wise choices in other areas have for improving performance.

Fleet Size and Age, Vehicle Type and Seating Capacity. Much of the discussion about fleet size was presented in the previous section, Service Area. Suffice it to say that fleet size has meaning only in the context of service area size. And, of course, how vehicles are used has at least as much to do with performance as their mere existence or deployment. (See section following: Operational Factors.) But it is the fleet size that sets the upper limit on what can be done with the vehicles.

To illustrate these points, shown below are common efficiency and effectiveness indicator values for systems examined, arranged according to fleet size:

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SYSTEM	FLEET SIZE	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR	AVERAGE WAIT TIME	AVERAGE RIDE TIME
Lowell	4	$ 3.78	4.13	20-30	30
Syracuse	5	3.00	3.6	N.A.	16
Columbus	6	13.69	1.13	N.A.	50
Sacramento (Paratransit Inc.)	6	4.26	3.06	5	17
Tulsa	7	1.95	10.71	30	30
Corpus Christi	8	2.50	3.26	N.A.	N.A.
Baton Rouge	9	4.00	2.6	5	N.A.
Lincoln	9	4.34	2.5	13	N.A.
Boston	11	11.62	1.5	10	27
Portland	11	3.66	3.6	60	60
Des Moines	11	2.88	3.1	9	16
Phoenix Dial-A-Ride	17	2.17	4.36	45	45
Phoenix Red Cross	17	1.40	1.84	N.A.	30-45
Orange County DAL	20	14.42	1.6	15	15
Orange County DAR (Fun Bus)	20	31.89	.9	N.A.	N.A.
Houston	21	11.57	1.14	10	29
Phoenix-Mesa	21	3.50	3.81	25	3
Tucson (SNTS)	31	4.43	3.32	30	20
Tucson (Handi-Car)	32	4.96	1.84	30	20
Broward County	51	4.37	3.4	45-60	90-120

There is no direct correlation whatsoever between the fleet size alone and performance. There are several reasons for this. For one, the number of vehicles *deployed* is more significant; because spare ratios vary greatly, fleet size itself is not a useful notion. Secondly, cost figures often are tied heavily to contract rates, which vary greatly without respect to either service area or fleet size. Third, average ride times correlate with passenger trips per hour, although the correlation has exceptions (either in systems with many shopping trips and group loads in small service areas, or where there is considerable deadhead time and low load factors). But most of all, fleet size alone has little meaning outside the context of service area size.

Vehicle age has its greatest impact on cost-related efficiency figures and on-time performance, the latter depending upon the spare ratio. When vehicles are more than three years' old, breakdowns are continual, and maintenance costs rise. (It is unclear at this point where the break-even point lies between continuing to maintain an old vehicle and purchasing a new one.) Where spares are few, breakdowns mean either the curtailment of service or severely lengthened wait and ride times, as other vehicles must cover for those broken down.

The type of vehicle used has three entirely different effects. First, fuel consumption varies by vehicle type. Secondly, different vehicle types generally encounter different maintenance problems, particularly when large vehicles are heavily loaded. (With larger loads, brakes and tires tend to wear faster, and on some buses chassis tend to break apart from large, heavy loads constantly shifting forward.) Thirdly, passenger-carrying capacity can make tremendous differences in efficiency on subscription service. For example, Broward County and Portland achieve relatively high overall passenger trip per hour values (3.4 and 3.61, respectively) for large service areas (400 and 860 square miles, respectively) because they serve many group shopping and nutrition trips on minibuses. And Tulsa's system averages 10.71 passenger trips per hour largely because three of its six deployed vehicles are full size line haul buses, used to transport large groups of handicapped schoolchildren and others to special programs. Vehicle size is usually academic to demand-responsive service, since the ride times for non-group loads of over six or seven persons are usually prohibitively long, and even the smallest vehicle can usually carry five persons (Checker sedans, the smallest vehicle commonly used, and selected largely for its roominess and seating capacity, has two fold-down jump seats, and can carry seven passengers).

Seating capacity in most cases is endemic to the vehicles, and only in rare cases does it restrict capacity, particularly where wheelchair positions are ill-placed so that their use leaves few ambulatory seats available.

Eligibility. Eligibility has definite, visible impacts on efficiency, effectiveness and financial performance, primarily because some types of users are more difficult, costly and time-consuming to transport than others. Also, certain user groups may not be charged fares, depending on the funding programs involved.

As noted earlier, trips made by elderly persons are relatively short, and many trips involve sizeable groups -- often from the same origin to the same destination. A large number, therefore, can be provided on an efficient subscription basis.

Trip needs of handicapped persons bear a sharp contrast to those of elderly persons. As described earlier, subscription service is impractical for most handicapped persons (the exception is children engaged in sheltered workshops or other education-related activities), who as a result, require demand-responsive service, often for long trips. And their trip needs are least well-served during the mid-day off-peak period, when most excess capacity normally exists.

These differences in efficiency are clearly reflected in a comparison of performance indicator values for those systems emphasizing service to elderly as compared to handicapped people:

SYSTEM	PASSENGER TRIPS/HOUR	COST/PASSENGER TRIP	AVERAGE RIDE TIME	AVERAGE WAIT TIME	OPERATING RATIO
Systems serving predominantly elderly persons:					
Broward County (SST)	3.4	$ 4.37	90-120	45-60	0
Portland	3.6	3.66	60	60	0
Tulsa	10.71	1.95	30	30	.09
Phoenix Dial-A-Ride	4.36	2.17	45	45	0
Des Moines	2.88	3.1	16	9	0
Corpus Christi	3.26	2.50	N.A.	N.A.	N.A.
Systems serving predominantly handicapped persons:					
Boston	1.5	$11.62	27	10	.09
Lowell	4.13	3.78	30	20-30	.083
Orange County Dial-A-Lift	1.6	14.42	15	15	.02
Tucson (SNTS)	3.32	4.43	20	30	N.A.
Tucson (Handi-Car)	1.84	4.96	20	30	N.A.
Lincoln	2.5	4.34	N.A.	13	.09
Houston	1.14	11.57	10	29	N.A.
Columbus	1.13	13.69	N.A.	50	.03
Baton Rouge	2.6	4.00	N.A.	5	.113

Clearly, efficiency is noticeably better for those systems dominated by elderly-oriented as opposed to handicapped-oriented service. And other factors, such as service area size or service concepts, do not account for such differences (while factors such as type of service, which have a bearing, stem from *eligibility*, which allows certain types of service to achieve maximum efficiency).

Effectiveness figures are pretty much the same for both handicapped- and elderly-oriented service. This is largely because load factors are higher for elderly-dominated service, and there are more intermediate stops per person. Thus each passenger's trip is circuitous and interrupted, making up for the fact that two of these trips can be served in the same amount of time as one to handicapped persons on a demand-responsive basis. In fact, if there is one characteristic common to the majority of special paratransit systems, it is the moderately long ride.

In summary, a system can deliver roughly twice as many elderly as handicapped trips in the same amount of time *despite* other factors (and perhaps more than twice as many if service is concentrated exclusively on non-handicapped elderly people. Such a reality helps to explain the relatively low efficiency of a few systems serving handicapped persons in small service areas compared to the high efficiencies of others serving primarily elderly persons in large service areas:

SYSTEM	PRIMARY USER GROUP	SERVICE AREA	VEHICLES DEPLOYED	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Boston	Handicapped	22	11	$ 11.62	1.5
Baton Rouge	Handicapped	88	6	4.00	2.6
Broward County	Elderly	400	44	4.37	3.4
Portland	Elderly	860	11	3.66	3.6

Weather/Climate/Topography. The physical and environmental features of a community have impacts on efficiency, effectiveness and financial performance, but only very minor ones compared to many other factors.

Efficiency is affected in several different ways by both harsh winters and long, hot summers. Ice and snow slow vehicles down, and often force drivers to take circuitous routes to avoid hills (Lowell). Dwell times increase substantially because passengers are more cautious in approaching the vehicles. Where service is door-to-door, drivers have to assist passengers in inclement weather who otherwise would be able to reach and board the vehicles on their own. And finally, the parking lots of many major destinations are not cleared, and drivers must assist passengers from drop-off points far from the door (Portland).

Hot weather has its major impact on air conditioner breakdowns, severely disrupting service, particularly where few or no spares are available.

Other physical and environmental features tear at the vehicles, increasing maintenance costs and requiring earlier replacement.* Two interesting examples are moist, salty coastal air, which induces corrosion damage (Broward County) and cobblestone streets, which upset wheel alignment and result in constant front-end adjustments and repairs, in addition to chewing up tires (Boston).

All of these physical and environmental factors have impacts on effectiveness, although in very different ways. Ice and snow operate as ride-limiting factors to many eligible riders, and may increase wait and ride times considerably for those who can still use the service. And inclement weather increases the frequency of cancellations and "no-shows." Hot weather is, obviously, a potential threat to comfort unless air conditioning units are operating in top working order. Finally, potholes and other topographical features make rides extremely bumpy, especially in older vehicles with worn suspension systems.

Operational Factors

Factors related to how service is provided--when, where, how frequently and on what basis--are perhaps the most influential factors affecting performance. As these are the factors over which the system operator generally has the most control, an understanding of precisely how they affect performance is critical.

Service Concept. The way in which the service area is divided up, with respect to time and space, and served by deployed vehicles may be referred to as the system's "service concept."

The service concept shapes system performance more than any other single factor. An perfect example of this may be found in the respective performance of systems in Boston and Portland. Both systems deploy 11 vehicles, have no spares and pay almost identical driver wages.* Yet here the similarity ends: Boston's trips cost $11.62 each while Portland's cost $3.66 each.

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*In many cases, some system funds may be used for either capital or operating expenses. In such cases, factors which chew up capital bite into operating funds.

One would at first suspect that Boston's service area is much larger. Yet, to the contrary, Boston's service area includes only 22 square miles, while Portland's includes 860 square miles. And the average trip length in Boston is four miles, whereas it is 25.1 miles in Portland. And Portland's service is door-to-door; Boston's is only curb-to-curb. How can this be?

Two closely-related factors are necessary to explain this seeming contradiction. First, Portland's service focuses on carrying elderly people whereas Boston's serves handicapped people exclusively. Secondly, partly because of its ridership, Portland's system has made choices with respect to time and space, aiming to increase efficiency by maximizing load factors and by serving as many trips as it can. This effectiveness tradeoff is both pragmatically justifiable and reasonable in an area where the system can at best meet only a small fraction of the target population's transportation needs.

Portland's service concept is similar to that of other medium-size cities with extremely large, sparsely-populated service areas (Lincoln, Syracuse). Officials selected a small inner area (22 square miles) where the greatest density of demand exists, and decided to concentrate service there. Portland's inner zone is contiguous with the transit district, and contains 68 percent of the County's elderly and handicapped persons (while containing only three percent of the service area's square miles).

Having agreed on this concept, Portland then began to reshape other system elements to optimize it. The outer zone (ring) was carved into eight sectors, each of which would receive service one or two half-days per week. Potential drivers who lived in outlying sectors of the service area were given highest preference in hiring. Drivers who lived in outlying sectors were then allowed to take the vehicles to and from work, bringing them home each night, and in so doing, essentially creating a one-vehicle operating division in each sector of the service area.

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*Boston's drivers earn from $3.75 to $5.25 per hour, but the system employs six CETA trainees, two of whom are drivers. Their salaries are not included in operating costs. Portland's drivers earn from $3.00 to $3.87 per hour, but most are at or near the top wage rate. Accounting for these differences, wages are very similar.

Further, on each sector driver's a.m. trip to the inner zone, he or she would pick up -- on a subscription-only basis -- passengers needing to reach the dense inner zone. Once in the inner zone (9:30 a.m. or so), two of the vehicles would be assigned to outlying zones and would serve them, on a demand-responsive basis, for the rest of the morning, and serve another sector during the early afternoon. The other six vehicles, plus three already operating in the inner zone since early morning, would then provide service on a demand-responsive basis to inner zone residents. Finally, at about 3:30 p.m., all 11 vehicles would return to the subscription mode, and the eight drivers housed in outlying sectors would pick up those persons who were dropped off at nutrition sites, hospitals, etc. in the morning, and return them to their homes on the driver's way back to his or her home.

Having a broad funding base, Portland also designed a certification procedure to qualify most of the riders who best fit in with the service concept: elderly people.* To compensate, somewhat, for emphasizing elderly people so strongly, Portland also focused on service for the most severely handicapped (e.g., dialysis patients) and informally afforded the highest priority for immediate-response service to those seeking medical assistance.

Finally, service in general focused on maximizing group trips by targeting common origins and destinations. Thus, even demand-responsive service is dominated by short shopping trips from senior citizens housing complexes to the closest shopping centers.

There are, of course, many community factors that bolstered the system's flexibility. Paramount among them is the credibility and respect which system officials have earned in the community, and the lack of deviciveness as a result. Another, obviously, is a demographic stratification compatible with the service concept. And finally, the state-mandated consolidation of all special paratransit systems helped to maximize vehicle utilization and reduce duplication.

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*This choice was not entirely without its constraints. Portland's RTP program grew out of a consolidation of three social service-oriented operations, and inherited the client groups of those services as a starting point. The most recent eligibility criteria merely fine-tuned this initial user group. It so happened, though, that the initial user group lent itself well to this service concept. It is difficult to say just how much one was affected by the other.

Broad comparisons between service concepts of all types reveal that those systems that subdivide their service areas into zones of some sort (which would rule out all the smallest areas) have higher efficiencies than those that don't -- regardless of eligibility, level changes accommodated, fleet size, service area size, wage rates or any other factors:

SYSTEM	SERVICE AREA (in square miles)	PASSENGER TRIPS/HOUR	COST PER PASSENGER TRIP
Systems not employing zones or modules:			
Lowell	15+	4.13	$15.60
Boston	22	1.5	11.62
Phoenix-Mesa	45	3.81	3.50
Tucson (SNTS)	98	3.32	4.43
Tucson (Handi-car)	98	1.84	4.96
Houston	300	1.14	11.57
Sacramento (Paratransit Inc.)	389	3.06	4.26
Orange County DAL	420	1.6	14.42
Columbus	531	1.13	$ 13.69
Des Moines	578	3.1	2.88
Phoenix Red Cross	1200±	1.84	1.40*
Systems employing zones or modules:			
Tulsa	50	10.71	$ 1.95
Baton Rouge	88	2.6	4.00
Corpus Christi	106	3.26	2.50
Phoenix Dial-A-Ride	168	4.36	2.17
Broward County (SST)	400±	3.4	4.37
Portland	760	3.6	3.66
Syracuse	785	3.6	3.00
Lincoln	843	2.5	4.34
Orange County (Fun Bus DAR)	N.A.	.9	31.87
Orange County (Yellow DAR)	N.A.	.2**	80.42**

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*The Phoenix Red Cross system uses volunteer drivers.

**The Elderly-only off-peak Placentia Dial-A-Ride, for which this figure pertains, had been operating for only one month at the time of the site visit.

In those systems employing zones or modules, cost per passenger trip varies somewhat directly with service area size. For those which do not, very little correlation exists. Logic would suggest the opposite: that in the absence of service concept as a variable, service area size would be more of a factor.

Operating Hours. Because the density of demand changes throughout the day and by day of the week, as do needs for different types of trips, operating hours can have a major impact on all efficiency indicators--depending, of course, upon how vehicles are deployed with respect to those operating hours. At this moment in paratransit's evolution, however, these impacts are minor compared to those of other factors.

Evening and weekend service is almost always demand-responsive, and most systems which provide it deploy vehicles according to demand rather than by a rigid scheme. Because of this, those systems which have recorded separate efficiency data for weekend or evening as opposed to weekday service have found weekend and evening service to be more efficient:

SYSTEM	COST/PASSENGER TRIP (weekday)	COST/PASSENGER TRIP (weekends & evenings)
Boston	$11.62	$ 6.93

Part of this higher off-peak efficiency stems from the practice of excluding administrative expenses from the calculation of weekend and evening operating costs. Much of it also stems from deployment according to demand for weekend and evening service, as opposed to the straight 8 hour shifts during the week, where the system experiences more than 50 percent deadhead time.

The period of lowest efficiency for most systems is the mid-day, off-peak period, when labor laws and practices prohibit or inhibit variable deployment.* One way to mitigate the low efficiency during this period is to provide only certain types of service (e.g., demand-responsive) or certain types of trips (e.g., social/recreational, medical) during this period, thereby more evenly distributing demand throughout the day (Portland, Broward County, Tulsa, Corpus Christi, Houston, Lincoln, Orange County Dial-A-Ride, Syracuse, Tucson).

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*This is not strictly a union-related problem. Lincoln, for example, which uses union labor, has several paratransit drivers on split shifts. Such scheduling is common practice among almost all line haul operations.

Effectiveness of service during evenings, weekends and holidays has not been measured quantitatively (just as most weekday effectiveness has not been). Most drivers and system officials claim that wait times and ride times are usually somewhat shorter during these off-peak hours: because demand is less intense, there are fewer group trips, and vehicles are more readily available.

Revenue for evening service differs largely because different fares are often charged for evening service -- particularly when a supplementary taxi service is employed.

Pre-Scheduling Format/Type of Service. A system's mix of subscription, pre-scheduled demand-responsive and immediate-response service has a great impact on its efficiency. Because those systems which provide the bulk of their service to elderly persons normally do so largely on a subscription basis, the stratification of cities by type of service closely resembles the stratification by eligiblity: those that carry predominantly the elderly are roughly twice as efficient as those carrying handicapped persons (see previous section titled Eligibility).

When and where these trip types are provided (i.e., how they function in the service concept) also have much to do with efficiency. Certain trip types--shopping, nutrition, routine medical and school--function much better on a subscription basis than do social/recreation, medical or work trips, which work much better in the demand-responsive mode (the exception to this is medical trips to centrally-located hospitals and clinics). Thus, to be highly efficient, subscription and demand-responsive service must be offered when the need for trip types compatible with them is present. As an illustration, systems which provide subscription service during the a.m. and p.m. peak periods and which emphasize demand-responsive service during the mid-day off-peak period exhibit somewhat higher efficiencies in terms of passenger trips per hour than those systems that mix the two types of service evenly throughout the day:

Systems providing subscription service evenly distributed throughout the day:

SYSTEM:	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Baton Rouge	$ 4.00	2.6
Boston	11.62	1.5
Columbus	13.69	1.13
Des Moines	2.88	3.1
Lowell	3.78	4.13
Phoenix Dial-A-Ride	2.17	4.36
Sacramento (Paratransit Inc.)	4.26	3.06

Systems providing subscription service only at certain times of day:

SYSTEM:	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Broward County (SST)	$ 4.37	3.4
Portland	3.66	3.6
Tulsa	1.95	10.71
Corpus Christi	2.50	3.26
Houston	11.57	1.14
Lincoln	4.34	2.5
Orange County (Fun Bus Dial-A-Ride)	31.89	.9
Syracuse	3.00	3.6
Tucson (SNTS)	4.43	3.32
Tucson (Handi-Car)	4.96	1.84

The frequency of immediate-response service also may affect performance, but here, the circumstances under which it is offered probably have more to do with efficiency than its mere availability. Most systems either direct immediate-response service to the maximization of effectiveness (for medical emergencies and other critical needs), or to the direct optimization of efficiency: immediate-response service is provided only when trips can be conveniently inserted into existing schedules, when space is available and when the insertion will not greatly increase ride times or trip lengths for existing, pre-scheduled passengers.

As has been pointed out earlier in this Volume, with respect to efficiency, the provision of immediate-response service is a double-edged sword. Providing it when convenient helps to round out schedules, and thereby increase efficiency in the short run. However, its provision discourages many riders from pre-scheduling trips, and as a result, the "routes" which develop are less efficient than largely pre-scheduled ones. The provision of immediate-response service always improves the quality of service for those trip types not well accommodated by pre-scheduled service (e.g., emergency medical trips, social/recreation trips, job interviews). Yet, ride and wait times for pre-scheduled rides may be lengthened in return.

Generally speaking, subscription service is the least effective in terms of ride times. Ironically, however, it is the most effective in terms of wait times: users know when they will be picked up, and that time remains constant from day to day. And as most schedules are built around subscription service, on-time performance at both ends of the trip is usually excellent. In addition, some users (e.g., elderly persons) fare much better with long ride times than do others (e.g., handicapped persons). Many elderly persons, in addition, share common origins. Finally, certain trip types (e.g., shopping and nutrition trips) are more compatible with subscription service than others (e.g., medical emergencies, social/recreational or therapy trips, where there are few common destinations).

Level Changes Accommodated. The impacts on performance of door-to-door versus curb-to-curb service are easy to understand, and operate only as minor factors. Door-to-door service does not mean that the drivers must assist everyone -- just those who need it. The distinction is that, with curb-to-curb service, those who need assistance either hire an attendant or do not use the system at all. And because boarding and deboarding time comprises only a small percentage of total trip time, the number of level changes accommodated only marginally affects efficiency or ride and wait times, and has even less of an impact on financial performance since it bears no relation to revenues.

There are a few subtle effectiveness benefits which may be derived from the provision of door-to-door service. One is the decrease in the frequency of cancellations and "no-shows": the driver's knock on the door is a more effective attentiongetter than a honked horn. Drivers can also monitor other problems when escorting someone to his or her door, particularly when they are allowed to enter dwellings to render assistance (Portland). But most important, for many otherwise regular users, the provision of door-to-door service in winter months makes trips possible which could not otherwise be made until Spring.

Trip Types Served. The impacts of trip types served on system performance are closely related to both eligibility and type of service. Very simply, certain types of trips work better on a subscription basis (e.g., nutrition, shopping and social service program trips), some work better on a demand-responsive basis (e.g., medical, social/recreational) and still others work well with either (e.g., school, routine medical, work). How well these three factors (eligibility, type of service, trip type) are correlated determines more about how a system performs than do any of the factors alone.

As an illustration, because subscription service is more efficient than demand-responsive service, the efficiency of systems focusing on nutrition and/or shopping trips is usually somewhat higher than that of systems focusing on social/recreational or medical trips:

Emphasis on Nutrition and Shopping Trips:

SYSTEM	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Broward County (SST)	$ 4.37	3.40
Des Moines	2.88	3.10
Portland	3.66	3.60
Tulsa	1.95	10.71
Tucson (SNTS)	4.43	3.32
Tucson (Handi-Car)	4.96	1.84
Baton Rouge	4.00	2.60

Emphasis on Social/Recreation and/or Medical Trips:

SYSTEM:	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Boston	$ 11.62	1.5
Houston	11.57	1.14
Lincoln	4.34	2.5
Lowell	3.78	4.13
Sacramento (Paratransit Inc.)	4.26	3.06
Syracuse	3.00	3.6
Corpus Christi	2.50	3.26

Very few systems provide a significant number of both work and nutrition trips (Des Moines), or work and shopping trips (Des Moines, Lowell, Milwaukee), despite the fact that both nutrition and shopping trips tend to occur during the mid-day, off-peak period, when work trips are rarely needed. And of all 30 systems examined, only Tulsa provides a substantial number of nutrition and social/recreational trips, two trip types also compatible by virtue of most-needed trip times.

Economic/Administrative Factors

Irrespective of how systems operate, the costs of labor, the fees paid to provider/contractees, the mix of drivers and non-drivers, the organizations involved in providing and administering service, and the fares charged system users all may affect efficiency and financial performance, but have no discernable impacts on effectiveness.

Wage Rates. The following table presents both cost-related and spatial/temporal measures of efficiency for systems with various wage rates:

SYSTEM:	COST/ PASSENGER TRIP	PASSENGER TRIPS/HOUR	AVERAGE HOURLY WAGE RATE (net)
Phoenix Red Cross	$ 1.40	$ 1.84	0
Corpus Christi	2.50	3.26	$3.96 - $4.10
Tulsa	1.95	10.71	5.88
Phoenix Dial-A-Ride	2.17	4.36	5.75
Des Moines	2.88	3.1	4.00 - 4.95
Syracuse	3.00	3.6	5.01 - 6.20

San Bernardino (all systems)	$ 3.46	3.2	$ 2.90 - $4.00
Phoenix-Mesa	3.50	3.81	4.25
Portland	3.66	3.6	3.00 - 3.87
Lowell	3.78	4.13	4.05
Baton Rouge	4.00	2.6	3.91
Sacramento (Paratransit Inc)	4.26	3.06	4.50 - 5.00
Lincoln	4.34	2.5	5.58 - 6.20
Broward County	4.37	3.4	4.20 - 5.20
Tucson (SNTS)	4.43	3.32	5.69
Tucson (Handi-Car)	4.96	1.84	3.10 - 3.77
Milwaukee	8.12	n/a	5.00 - 6.00
Houston	11.57	1.14	3.15 - 5.00
Boston	11.62	1.5	3.75 - 5.25
Columbus	13.69	1.13	5.48
Orange County (Dial-A-Lift)	14.42	1.6	3.50 - 4.50
Orange County (Fun Bus DAR)	31.89	.9	4.00 - 4.75
Orange County (Yellow-Checker DAR)*	80.42	.2	4.00 - 5.25

From the above table, it is apparent that neither cost-related nor passenger-related efficiency correlate at all with wage rates. The most obvious reason for this is the fact that drivers control virtually none of the factors which have an impact on performance. As mentioned earlier, those factors which do impact performance have such pronounced effects that minor factors such as wage rates have only negligible effects if any. And further, many operating agencies which pay relatively high wages, such as transit operators, have other features (maintenance facilities, access to low-cost insurance, driver training programs, monitoring procedures, etc.)which offset their higher labor costs. Finally, unlike the transit industry, wages comprise only between 25 and 40 percent of total operating costs in paratransit operations (they comprise between 70 and 80 percent in transit).

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*This system had been operating for only one month at the time of the site visit.

Contract Rates. Contract rates appear not only to have a major impact on efficiency in terms of costs, but a striking impact in terms of passenger-carrying efficiency:

CONTRACT OPERATIONS	COST/PASSENGER TRIP	PASSENGER TRIPS PER HOUR	RATE PER HOUR
Des Moines	$ 2.88	3.1	($8.93)*
San Bernardino (all)	3.46	3.2	$12.00 - $12.75
Phoenix-Mesa	3.50	3.81	12.64 (sedans) 14.14 (vans)
Lowell	3.78	4.13	15.60
Sacramento (Paratransit Inc.)	4.26	3.06	16.38
Tucson (Handi-Car)	4.96	1.84	$1.05/mile
Milwaukee	8.12	N.A.	N.A.*
Houston	11.57	1.14	$12.00 - $14.00
Boston	11.62	1.5	15.73
Columbus	13.69	1.13	15.49
Orange County Dial-A-Lift	14.42	1.6	16.00
Orange County (Fun Bus Dial-A-Ride)	31.89	.9	20.00

Although other factors must be considered, the observation is inescapable that the lowest contract rates correlate not only with the lowest costs per passenger trip, but the highest passenger trips per hour as well. Neither service area size, service concept, elgibility, pre-scheduling format nor any other factor alone appears to account for such a correlation.

There appears to be little distinction between the efficiencies achieved by private, non-profit providers compared to those achieved by private, for-profit providers:

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*This operating agency is not paid on a per-hour basis; the figure cited for Des Moines is the cost per hour of operations computed by multiplying cost/passenger trip by passenger trips/hour.

PRIVATE, FOR-PROFIT PROVIDER:	COST PER PASSENGER TRIP	PASSENGER TRIPS PER HOUR	COST PER HOUR
Phoenix-Mesa	$ 3.50	3.81	$12.64 (sedans) 14.14 (vans)
Lowell	3.78	4.13	15.60
Tucson (Handi-Car)	4.43	1.84	n/a
Orahge County Dial-A-Lift	14.42	1.6	23.67*
Orange County (Fun Bus Dial-A-Ride)	31.89	.9	29.23**
PRIVATE, NON-PROFIT PROVIDER:			
Sacramento (Paratransit Inc.)	4.26	3.06	16.38***
Boston	11.62	1.5	15.73
Columbus	13.69	1.13	15.49***
SYSTEMS USING BOTH FOR-PROFIT AND NON-PROFIT PROVIDERS:			
San Bernardino (All Systems)	3.46	3.2	$12.00 to $12.75***
Houston	11.57	1.14	12.00 to 14.00***

Regarding the relative efficiencies of contract operations versus those not contracted out, clearly all the systems at the top of the efficiency spectrum are non-contract operations, and all those at the bottom are contract operations. Compared to the above-illustrated efficiencies for contract operations, the efficiencies of non-contract operations are noticeably higher:

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*The contractor receives $16.00 per hour. The difference is absorbed by the lead agency.

**The contractor receives $20.00 per hour. The difference is absorbed by the lead agency.

***These costs do not include lead agency or other non-provider costs.

SYSTEM:	COST/PASSENGER TRIP	PASSENGER TRIPS/HOUR
Phoenix Red Cross	$ 1.40	1.84
Tulsa	1.95	10.71
Phoenix Dial-A-Ride	2.17	4.36
Corpus Christi	2.50	3.26
Syracuse	3.00	3.6
Portland	3.66	3.6
Baton Rouge	4.00	2.6
Lincoln	4.34	2.5
Broward County	4.37	3.4
Tucson (SNTS)	4.43	3.32

There are, as always, some interesting caveats. For one, the one exception to the above rule is Des Moines, a contract operation. But here, the operating agency is the transit authority. On the other hand, in both Tucson and Sacramento, where part of the service is contracted out, there does not appear to be any major differences in efficiency (service areas for both sister operations are contiguous). Tucson's SNTS (non-contract) has higher cost-related efficiency than its contract counterpart ($4.43 per passenger trip compared to $4.93 per passenger trip), but the latter carries only wheelchair users. In Sacramento, the non-contract operation had no useful performance data, but Project Team observations suggested that the contract operation (which had shorter operating hours and newer equipment) is more efficient. In either case, the contract operations were newer, and were designed as supplements.

Finally, very little of the difference in cost-related efficiency between contract and non-contract operations is attributable to profits. Non-profit provider rates are, as we have seen, similar to those of for-profit providers. Further evidence may be seen in a comparison of costs per hour for non-contract as opposed to private, for-profit contract operations:

NON-CONTRACT SYSTEMS	COST/HOUR
Phoenix Red Cross	$ 2.59
Corpus Christi	8.15
Tulsa	20.95
Phoenix Dial-A-Ride	9.45
Syracuse	11.40
Portland	13.19
Baton Rouge	10.42
Lincoln	10.74
Tucson (SNTS)	14.70
Broward County	14.87

PRIVATE, FOR-PROFIT CONTRACT OPERATIONS	COST/HOUR
San Bernardino (all)	$12.00 to $12.75
Phoenix-Mesa	12.64 (sedans) to 14.14 (vans)
Lowell	15.60
Tucson (Handi-car)	N.A.
Milwaukee	n/a
Houston	12.00 to 14.00
Orange County DAL	16.00
Orange County DAR (Fun Bus)	20.00

Of course, the figures for private, for-profit operations exclude costs associated with the lead agency. Such costs may be substantial (e.g., they add another $9.32 to the Orange County Fun Bus Dial-A-Ride operation's costs). But non-contract operations do not encounter many of these costs (associated with financing, monitoring, etc.), so the comparison is more valid without them. Viewing the figures in this context, there appears to be little difference in per-hour costs between contracted and "in-house" operations.

Of the conclusions which can be drawn from the above, several are surprising:

-- Non-profit contract operations appear to be more costly and less efficient than private, for-profit contract operations, and

-- While costs of in-house operations do not appear to differ much from those of contracted out operations, the efficiencies differ markedly: In-house operations are noticeably more efficient both in terms of cost-related factors and in passenger carrying ability. Much of this may be explained by the peculiarities of the sample examined. Many of the large, in-house operations focus on subscription trips to elderly and low income persons, whereas many of the contract operations focus on handicapped persons (Boston, Lowell, Orange County Dial-A-Lift, Tucson Handi-Car).

Driver to Non-Driver Ratio. As operating agencies increase their pre-scheduling capabilities, additional non-driving personnel must be added, increasing operating costs which somewhat offset the efficiencies which accrue from pre-scheduling. Just how much such overhead offsets the efficiencies gained is unclear, and the tradeoff has been a source of debate throughout special paratransit's brief, recent history.

In most cases, system operators do not choose the mix of scheduled as opposed to dispatched service. Rather, this mix is somewhat determined by the normal operating characteristics of the service provider. Taxi companies, which generally dispatch all their regular service, usually dispatch all special service as well, especially when it is integrated into general service (~~Phoenix~~-Mesa, Milwaukee, Orange County Yellow Checker Dial-A-Ride, San Bernardino Dial-A-Rides). In some cases, particularly when lead agencies are heavily involved in operations, taxi service is pre-scheduled (Broward County Handicab, San Bernardino's east valley Dial-A-Lifts). And occasionally, a system which requires advanced notice for all trips dispatches rather than schedules them anyway (Lincoln, Tucson Handi-Car).

In the case of dispatched service, taxi operators claim that such an approach puts the money into service rather than overhead, and that an efficiently managed and well-designed dispatching system can compete, in terms of efficiency, with a pre-scheduled operation. At the other extreme, transit operators, used to running tightly scheduled operations, generally try to do the same with their demand-responsive services (Corpus Christi, Syracuse, Des Moines, Tulsa), regardless of whether or not the bulk of service is provided on a subscription or demand-responsive basis. City or county-run systems tend to pre-schedule most operations, maximizing subscription trips whenever possible (Broward County, Phoenix Dial-A-Ride, Portland). But their user groups lend themselves more favorably to such service than those of other operating agency types.

In conclusion, the driver to non-driver ratio has little to do with paratransit system performance.

Lead and Operating Agencies. Lead and operating agencies, particularly the latter, potentially have a major impact on efficiency because so many aspects of service are related to them: wage rates, availability of maintenance facilities, operating expertise, vehicles and profit margins, to name only a few.

Several factors unfortunately blur the comparison of efficiencies among operating agency types. First, many transit agency systems are second generation systems which have had an opportunity to learn from past systems' mistakes. Second, eligibility, a major efficiency-related choice, is beyond the operating agency's control.

In conclusion, while lead and operating agencies' performance may reflect differences stemming from other variables associated with them, the choice of lead and/or operating agency itself has little direct bearing on performance.

Fares. Because fares are the numerators in the calculation of the operating ratio (i.e., farebox revenue ÷ operating costs), they are major determinants of financial performance. At one extreme, free fare systems obviously have the lowest financial performance. But where fares are charged, differences in operating costs also affect the formula. As a result, it is not always true that those systems with the highest fares exhibit the highest financial performance:

SYSTEM:	OPERATING RATIO	PASSENGER TRIPS/HOUR	FARES CHARGED
Milwaukee	.173	n/a	$1.00 plus revenue beyond the $7.00 meter limit;
Phoenix-Mesa	.17	3.81	$1.00 for general riders, 40¢ for E&H riders--plus additional charges for zones;
Baton Rouge	.113	2.6	45¢;
San Bernardino (all systems)	.11	3.2	35¢ or 50¢ per zone or city
Syracuse	.10	3.6	50¢ to $1.00;
Lincoln	.09	2.5	40¢;
Tulsa	.09	10.71	50¢ on demand-responsive runs, 12 1/2¢ on subscription runs;
Boston	.09	1.5	75¢;
Lowell	.083	4.13	25¢ to $1.00 (to downtown Boston);
Columbus	.03	1.13	60¢;
Orange County Dial-A-Lift	.02	1.6	50¢, and
Orange County (Fun Bus DAR)	.01	9	50¢ to $1.00 per module.

Four patterns seem to emerge from the above. First, most systems which experience relatively high operating ratios (above .10) serve general riders as well as well as elderly and handicapped persons. Second, of those systems not serving general riders and achieving operating ratios between .083 and .10, all operate in either small service areas or predominantly within inner zones. Conversely, those with low operating ratios operate, for the most part, in large service areas. Third, efficiency in terms of passenger carrying seems to correlate highly with operating ratios: the higher the operating ratio, the more passenger trips per hour (this is only logical, because more riders translate into more fares). Fourth, the one factor which seems to make no difference whatsoever is the amount of the fare. The reason for this is that fares normally cover only a small percentage of operating costs, and the difference between a "large" tiny piece and a "small" tiny piece is not significant enough to affect the performance indicator compared to impacts on the cost side, or denominator, of the equation.

NEW WAYS OF VIEWING PARATRANSIT PERFORMANCE

The preceding analysis has identified several major factors which strongly influence performance by themselves:

- -- Service concept;
- -- Eligibility;
- -- Pre-scheduling format/type of service;
- -- Type of trip, and
- -- Contract rates.

Unfortunately, the examination of these factors' isolated impacts on performance are extremely limited, and fail to show precisely how performance is shaped, or what the key factors are. For one thing, certain of these factors have quite similar effects on performance--e.g., eligibility, pre-scheduling format and type of trip. In such cases, it is impossible to assign a portion of the total impact to any one of them. (However, as this section shall illustrate, it is also unnecessary.) Secondly, some factors which appear to have no impact on performance by themselves may have major impacts when related to other factors. The example that most easily comes to mind here is that of service area size and fleet size. Finally, spatial/temporal notions of performance (e.g., passenger trips per hour or per mile) may be influenced by different factors, and/or in different ways by the same factor, than cost-related measures of performance (e.g., cost per passenger trip).

Because of these realities, the examination of groups of factors--including a few which have no discernible impacts on performance when taken separately--reveal far more about performance than does the analysis of these factors alone. Such an examination will reveal more useful indicators of performance than those traditionally used, borrowed from line haul technology as they are.

Service Area and Fleet Size

It was noted earlier that fleet size tends not to increase proportionately with increases in service area size. And although fleet or service area size alone have no apparent bearing on performance, it is interesting to see how performance changes with respect to the changing relationship between these two variables. The table following presents, in ascending order, a ranking of systems by square miles covered per vehicle deployed (mi^2 per VD):

SYSTEM:	Mi^2 PER V.D.	VEHICLES DEPLOYED	SERVICE AREA (mi^2)	PASSENGER TRIPS/HOUR	SERVICE CONCEPT
Boston	2.0	11	22	1.5	small area, no zones
Phoenix-Mesa	2.1	21	45	3.81	small area, no zones
Tucson (Handi-car)	3.1	32	98	1.84	medium area,no zones
Tucson (SNTS)	4.9	20	98	3.32	medium area,no zones
Lowell	5.0+	3	15+	4.13	small area, no zones
Tulsa	8.3	6	50	10.71	zones
Broward County (SST)	9.1	44	400±	3.4	zones
Phoenix Dial-A-Ride	9.9	17	168	4.36	zones
Corpus Christi	13.2	7	106	3.26	zones
Baton Rouge	14.7	6	88	2.6	zones
Houston	15.8	19	300	1.14	large area, no zones
Orange County DAL	42	10	420	1.6	large area, no zones
Des Moines	52.5	11	578	3.1	large area, no zones
San Bernardino DALs	54.5	11	600±	N.A.	large area, no zones
Phoenix Red Cross	75	16	1200±	1.84	large area, no zones
Portland	78	11	860	3.6	inner-outer zones
Sacramento (Paratransit Inc.)	78	5	389	3.06	large area, no zones
Columbus	106.2	5	531	1.13	large area, no zones
Lincoln	120	7	843	2.5	inner-outer zones
Syracuse	157	5	785	3.6	inner-outer zones

Several correlations between [/] per V.D. and other values are striking:

- -- With the exception of Boston and Tucson, (understandable exceptions for several reasons), all systems with a mi^2 per V.D. of 13.2 or less provided more than 4.00 passenger trips per hour;
- -- Except for the three systems with the largest contiguous areas (Lincoln, Portland, Syracuse) and which have inner-outer zone service concepts, none of the systems with high mi^2 per V.D. employ zonal service concepts of any kind;*
- -- Within the low end of the mi^2 per V.D. range (i.e., those systems with values of less than 13.2 mi^2 per V.D), there is no correlation between mi^2 per V.D. and passenger trips per hour. This is probably due to the fact that in the lower end of the mi^2 per V.D. range, trip lengths are uniformly short, since all systems within this range either have small service areas (Boston, Lowell, Tulsa, Phoenix-Mesa) or employ zonal service concepts (Corpus Christi, Broward County, Phoenix Dial-A-Ride). In the latter cases, these zones effectively limit the actual area covered by each vehicle, thus allowing the zonal systems to compare more favorably with those systems with small service areas;
- -- Those few systems with high mi^2 per V.D. values, and which have moderately high spatial/temporal performance (between 2.5 and 4.00 passenger trips per hour) have certain characteristics in common which help to explain such performance:
  - three of them (Lincoln, Syracuse, Portland) employ inner-outer zone service concepts;
  - most serve a predominance of trip types which lend themselves well to group scheduling, and
  - all provide primarily subscription trips.
- -- Those systems with moderate mi^2 per V.D. (13.9 to 18.1 mi^2 per V.D.) either have relatively large fleets (Houston) or employ zonal service concepts (Baton Rouge);

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*The Phoenix Red Cross actually has the largest service area, but it is a non-contiguous linkage of several communities.

-- All high mi^2 per V.D. occur in large service areas. Of the five systems within that range which provide a moderate amount of passenger trips per hour (2.5 to 4.00), three use inner-outer zone service concepts and two others (Des Moines, Sacramento) provide the bulk of their service in certain small areas, and in addition, provide a large number of group trips.

Using mi^2 per V.D. as a means of classification, it is possible to sort all the systems examined into three groups:

-- (A) -- Small Service Areas or Zones -- These systems have either low mi^2 per V.D. (below 15) or low mi^2 per V.D. in their inner zone portions, and moderate (at least 2.5) to high PT/H (passenger trips per hour);*

-- (B) -- Large Service Areas and Large Fleets (i.e., 20 or more vehicles deployed) -- These systems have moderate mi^2 per V.D., and low to moderate PT/H, and**

-- (C) -- Large Service Areas and Small or Moderate Fleets (less than 20 vehicles deployed) -- These systems are characterized by high mi^2 per V.D. and low to moderate PT/H.

In terms of what one needs to achieve moderate to high spatial/temporal performance (i.e., PT/H), the following postulates apply:

(1) Given a small service area, PT/H will be moderate or high regardless of service area or fleet area, unless the eligibility/pre-scheduling format/trip type package is balanced strongly in favor of effectiveness at the expense of efficiency (Boston);

(2) Given a large service area, in order to achieve moderate to high PT/H the system must either use zones, have a large fleet, or balance the eligibility/pre-scheduling format/trip type package in favor of efficiency, and

(3) Given a large area, PT/H much greater than 3.00 will not be possible without using some sort of zonal service concept.

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*Boston is an exception.

**The sample used in this analysis unfortunately was too small to draw solid conclusions about PT/H for systems in this class, but moderate PT/H would be most likely.

Group Trip Frequency

As the preceding analysis has demonstrated, the impacts of several factors on performance--both spatial/temporal and cost-related--are similar. Most alike of these factors are eligibility, pre-scheduling format and type of trip.

What these three factors, and several others, have in common is their effect on the potential of forming group trips. The table following correlates basic performance indicator values for the systems with the degree to which those systems shape factors toward the maximization of efficiency.

The conclusions which can be drawn from the table which follows are consistent with those presented in the earlier portion of this analysis:

(1) Those systems with the highest spatial/temporal performance, as well as the highest cost-related performance, are those which have the highest efficiency maximization of factors which affect group trip-making potential;

(2) Of the six factors which may contribute to group trip-making potential, the three factors most common to the highest performing systems are eligibility, pre-scheduling format and trip types;

(3) Of those systems which do not maximize efficiency with respect to the group trip-making package, whether or not mi^2 per V.D. correlates with PT/H or C/PT (cost per passenger trip) depends solely on whether or not the system employs a zonal or modular service concept or has a small service area, and

(4) In the absence of either a small service area or zonal service concept, without using the "group trip package," not only does mi^2 per V.D. not correlate with efficiency, but the system's efficiency will generally be low altogether.

CONCLUSIONS

In order to achieve moderate to high efficiency, a system must employ a group trip service orientation and have either a small service area or a zonal service concept. These three factors may be considered as primary factors, because they have profound and far-reaching effects on performance regardless of how other factors operate. Contract and wage rates may be considered as secondary factors because they may have minor impacts on performance, all other things being equal (i.e., major differences in primary factors wash out observable differences from secondary factors). Finally, factors such

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	EFFICIENCY:			FACTORS SHAPED TOWARD ACHIEVEMENT OF HIGH EFFICIENCY:					
SYSTEM:	COST/PASSENGER TRIP	COST/HOUR	PASSENGER TRIPS/HOUR	TRIP TYPES SERVED	PRE-SCHEDULING FORMAT	OPERATING HOURS	ELIGIBILITY	CENTRALIZATION OF DESTINATIONS	COMMONALITY OF ORIGINS
Phoenix Red Cross*	$ 1.40	$ 2.59	$ 1.84	-	-	-	-	-	-
Corpus Christi	2.50	8.15	3.26	X	X	X	X	X	X
Tulsa	1.95	20.95	10.71	X	X	X	X	X	X
Phoenix Dial-A-Ride	2.17	9.45	4.36	X	X	-	X	X	X
Des Moines	2.88	8.93	3.1	X	X	X	X	X	X
Syracuse	3.00	11.40	3.6	-	-	X	X	-	-
San Bernardino** (all systems)	3.46	12.08	3.2	-	-	-	X	-	-
Phoenix-Mesa	3.50	13.33	3.81	-	-	-	-	-	-
Portland	3.66	13.19	3.6	X	X	X	X	X	X
Lowell	3.78	15.60	4.13	-	X	-	-	-	-
Baton Rouge	4.00	10.42	2.6	-	X	X	X	-	-
Sacramento (Paratransit, Inc.)	4.26	12.78	3.06	-	X	-	-	-	-
Lincoln	4.34	10.74	2.5	-	-	X	-	-	-
Broward County	4.37	14.87	3.4	X	X	-	X	X	X
Tucson (SNTS)	4.43	14.70	3.32	X	X	-	X	X	-
Tucson (Handi-Car)	4.96	N/a	1.84	X	-	-	X	X	-
Milwaukee	8.12	n/a	N.A.	-	-	-	-	-	-
Houston	11.57	13.19	1.14	-	X	X	-	-	-
Boston	11.62	15.73	1.5	-	X	-	-	-	-
Columbus	13.69	15.52	1.13	-	X	-	-	-	-
Orange County (DAL)	14.42	23.67	1.6	-	X	X	X	-	-
Orange County (Fun Bus DAR)	31.89	29.32	.9	-	X	X	X	-	-
Orange County*** (Yellow DAR)	80.42	20.66	.2	-	-	X	X	-	-

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*This system employes volunteer drivers.

**Figures include general Dial-A-Ride passengers as well as the Elderly and Handicapped.

***This system had been operating for only one month at the time of the site visit.

as level changes accommodated, driver to non-driver ratio, weather/climate/topography, etc., may be considered as _peripheral factors_, because they have little noticeable bearing on efficiency or effectiveness.

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CHAPTER VI: PROBLEMS

Like almost any newly-developing field, special paratransit service has experienced quite a number of problems during its first few years of evolution.

Twenty seven specific problems were identified by system officials, users and other community members in the eighteen cities examined in this Project. Many of these problems are common to quite a few of these communities, some to all of them. This Chapter will attempt to describe these problems, their impacts on service delivery or system operations, and solutions which have successfully addressed them.

For purposes of simplification and clarity, these problems have been classified into the following categories:

-- Institutional problems;

-- Operational problems, and

-- Problems of supply and demand.

The chart which follows indicates which cities have experienced each of these problems.

CITIES/COUNTIES

PROBLEMS	BATON ROUGE	BOSTON	BROWARD COUNTY	COLUMBUS	CORPUS CHRISTI	DES MOINES	HOUSTON	LINCOLN	LOWELL	MILWAUKEE	ORANGE COUNTY	PHOENIX	PORTLAND (Me)	SACRAMENTO	SAN BERNARDINO	SYRACUSE	TUCSON	TULSA
INSTITUTIONAL																		
Lack of Cooperation	x								x				x		x			x
Lack of Coordination	x	x		x		x						x			x			
Control over Vehicles	x	x									x	x						
Privacy Act		x																
Organized Labor	x			x							x					x		
Funding Constraints	x					x	x		x		x	x					x	
16(b)(2) Fragmentation			x						x				x		x			
Insurance			x								x				x			
Radio Licencing/Control			x								x				x			
Franchises & Jurisdictions			x							x		x			x		x	x
Government Regulations			x							x	x				x			x
OPERATIONAL																		
Vehicle Design	x	x					x										x	
Equipment Design	x	x			x	x								x				
Gen'l Maint. & Downtime			x	x			x				x		x	x		x		
Weather/Climate/Topography	x	x	x		x		x	x	x	x	x	x	x		x	x	x	
Level Change Limitations		x				x		x	x	x						x		
Driver-Related Problems	x	x	x								x							
Data Coll./Record Keeping			x							x				x				
Procurement		x	x							x					x			
Reservation Procedures	x	x	x	x	x			x	x	x	x	x	x	x	x	x		x
Duplicative Service		x	x								x	x		x	x	x	x	
Monitoring & Enforcement										x				x				
SUPPLY and DEMAND																		
Unmet General Demand	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Unmet Articulated Demand		x	x		x		x	x	x				x	x	x	x		
Seasonal Shifts in Demand			x															
Uneven Utilization	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gen'l Ride-Limit. Factors	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

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INSTITUTIONAL PROBLEMS

Institutional problems involve regulations, funding constraints, cooperation and coordination or the lack thereof, franchises and licensing, lawsuits and structural/organizational fragmentation.

Lack of Cooperation, and Parochialism

Even where they fully understand the benefits of cooperation, many agencies and community officials are reluctant to work with other agencies or persons to resolve planning- or service-related problems. In Baton Rouge, special paratransit service was shuffled back and forth among four different agencies since its 1971 origin. Until recently, the obsession with autonomy among fellow suburban communities has impeded the Lowell RTA from coordinating even a single aspect of its Roadrunner service with other special paratransit systems -- despite the fact that Roadrunner's operating agency provides many of those services. Portland's RTP service constantly encounters closed gates and other physical barriers at community facilities. And because doctors and other program officials do not adhere closely to appointment schedules, return trips cannot be pre-scheduled. In San Bernardino, three of four participants in a newly-formed brokerage program dropped out when asked to comply with the Section 15 FARE reporting requirements. And although much of Tulsa's EHT service is provided to school children, state laws and other institutional barriers prohibit the schools from loaning idle school buses to EHT in return for the service.

Lack of Coordination

While six of the communities examined in this Project cited lack of coordination as a major problem, it has been a problem to some degree in every community. Constraints associated with funding sources, directives from political officials, institutional policies and general disinterest in coordination often interfere with the rational provision of service.

That such a problem exists at the local level is not surprising. The array of special transportation services which currently exists in each community emerged from years of isolated development by social service agencies and other community groups with different and often contradictory service objectives. Now firmly established, these services have developed their own constituencies, their own policies and their own bureaucracies. Melting them down into larger, more efficient organizations is a difficult task. In Baton Rouge, various agency officials claim that the fragmentation of Federal funding sources "has their hands tied." Boston's special service for handicapped persons is not coordinated in any way with any of the more than 200 other service providers in the Boston area -- including a system provided by the same operating agency. San Bernardino's three operating agencies each run a separate dial-a-ride and dial-a-lift system. Community officials in Columbus don't view the lack of coordination as a problem at all, and view their Project Mainstream as a mere supplement to other existing special services. And in Phoenix, state regulations prohibiting the sale of rides among services has forced the community to establish a barter-style sharing program whereby an intermediary must "negotiate" shared trips among the participating agencies.

Control over Vehicles

Vehicle ownership has been a major barrier to coordination. Many communities' charters do not permit city-owned vehicles to leave the city limits, and as a result, the coordination of small suburban with large urban services has not been possible (Phoenix, Broward County).

A more frustrating experience has been the inability of operating agencies which run several similar special services to coordinate them merely because the lead agency -- usually the transit agency -- owns the vehicles for only one of the services (Boston).

Privacy Act

Boston's client referral effort has been thwarted by the Privacy Act, which forbids organizations and agencies from releasing personal information about their members or clients without their permission. MBTA, the lead agency responsible for client referral, is thus unable to secure names and telephone numbers of would-be eligible handicapped persons to offer them service. The inadequate client referral effort is partly responsible for the system's 50 percent deadhead time.

Organized Labor

While the national headquarters of the Country's three transit labor unions (Transport Workers Union, Amalgamated Transit Union and United Transportation Union) have not begun an organized, solidified push to subsume paratransit operations under transit agency structures, they generally will support the efforts of locals which choose to activate for control of these operations. The initial year or two of a community's paratransit operation commonly has been viewed by the local unions as a "pilot program." Yet, once these operations have been firmly established, and on the verge of expanding their fleets and solidifying their funding bases, many unions have begun to pressure community and system officials to transfer them to transit agency control (Boston, Columbus). Orange County's mixed mode paratransit service, involving a combination of demand-responsive and small-vehicle fixed route service, had to be abandonned because of a formal agreement with the transit union forbidding non-union fixed route operations. Efforts to coordinate Syracuse's Call-A-Bus service with its sister operation, County Shuttle -- a non-union system sharing the same lead agency (the transit authority) -- have been stymied because of the union's unwillingness to operate a union service alongside a non-union one. The Des Moines local, on the other hand, found such an arrangement quite acceptable.

Funding Constraints and Regulations

Funds for paratransit have been grossly inadequate throughout most of the country. Turnaround time, confusion and frustration associated with the multiplicity of Federal and state funding sources have dissuaded many paratransit operators from seeking many of the funding packages available. As a result, few systems have similar funding structures. And service in several communities was disrupted when funding was discontinued (Baton Rouge, Des Moines, Houston, Lowell, Orange County, Phoenix, Tucson).

State statutes often place limits on how much money may be allocated or reserved (e.g., for self-insurance), on how much state funds may be used, and under what conditions. California Senate Bill 620, which requires that 10 percent of special paratransit's operating costs be recovered from the farebox, has led to a dissolution of coordination arrangements, as systems attempt to meet program requirements by shifting from operating to capital costs, buying more vehicles for separate use. The Phoenix Red Cross went in and out of business so many times that system officials find it impossible to undertake any planning or to make meaningful service improvements. And many of Tucson's social service agencies have curtailed their transportation programs, reallocating precious funds to other program activities, and effectively "dumping their clients" on the public system.

Fragmentation and the 16(b)(2) Program

While regulations accompanying the 16(b)(2) Program plead for coordination, they also insist that the recipient maintain control over the vehicles purchased with the 16(b)(2) funds. This reality has led to the proliferation of small service provider-agencies in most cities, and has hampered the ability of 16(b)(2) administrators to assist providers in forming coordination agreements.

In a few communities, problems with the 16(b)(2) process have discouraged system officials from using the program as a means of acquiring vehicles. Lowell's RTA does not have enough staff to wrestle with the elaborate program justifications necessary to comply with the 16(b)(2) process. In Maine, the state department of transportation's handling of the 16(b)(2) program has left Portland's RTP fleet with a plethora of design deficiencies and 11 completely different vehicles.

One community has made interesting progress in this area, and its system productivity is testimony to its importance. The Broward County Division of Florida DOT has drafted a model "memorandum of understanding" requiring recipient agencies to "loan" their vehicles to the major county paratransit system when not in use, or to "loan" them on a permanent basis in return for that agency serving the recipient's clients.

Insurance

Insurance has been a problem to some degree in almost every community. Systems with volunteer drivers (who often receive little training) do not qualify for extensive insurance, and as a result, cannot be coordinated with larger, more professional systems which maintain high coverage. Another major problem has been the high costs associated with insurance, ranging from $500 to $1600 per vehicle per year for vans and from $1100 to $2600 per vehicle per year for taxis. And statewide statutory limits on self-insurance are quite common.

Regulatory constraints associated with insurance may be more troublesome than the insurance's cost or difficulty of acquiring it. In San Bernardino, 16 of 20 small providers dropped out of a brokerage program because they could not obtain or afford the $300,000 minimum liability coverage required by the lead agency. In Broward County, CETA workers were unable to use their own vehicles because of insurance limitations on the use of such vehicles for full-time work, and because of a prohibition on transporting special needs passengers in private vehicles.

Radio Licensing and Channel Control

Special paratransit systems often encounter difficulties obtaining both licenses and separate channels for their radios. San Bernardino's multi-provider operation had to run its program entirely on a pre-scheduled basis for its first 10 months, until Federal Communications Commission approval for a radio frequency was granted. System officials had virtually no control over the vehicles once they left the yards. Vehicles in Orange County often must lie idle until Citizens Band interference ceases, enabling drivers to use the common radio channels to obtain the next set of instructions from the dispatcher.

Franchises and other Jurisdictional Constraints

The service concepts of many systems (Phoenix, Tucson, Tulsa) are strongly affected by the jurisdictional limitations of the contract providers operating those systems. And when special paratransit service is integrated into the regular operations of a provider (Milwaukee, Orange County, Phoenix-Mesa, Tulsa, San Bernardino), service characteristics must be consistent with those established for general service.

Operating constraints imposed by jurisdictional boundaries have taken a number of forms. Because of funding constraints and vehicle ownership and control requirements associated with the 16(b)(2) Program, many Broward County and Phoenix communities can run only intracity operations. In Milwaukee, as in most user side subsidy operations, the shape of the special service package is dependent upon the operating characteristics of the general, exclusive-ride taxi service. As a result of a court ruling in Tucson, the City's Special Needs Transportation Service (SNTS) has to make deals with the sole licensed taxi company in order to provide paratransit service within this area. Currently, one serve wheelchair users and the other non-wheelchair users; both operate in the identical service area.

Government Regulations

Many common Federal requirements (Section 15 FARE reporting requirements, Low Bid, etc.) have at least indirectly affected almost all paratransit systems. Yet a few regulations have been particularly burdensome to some systems, especially where they conflict with state laws or regulations. The Federal law requiring employers to match employee social security contributions has discouraged the subleasing of taxis in Milwaukee because a Wisconsin statute defines cab owners subleasing their vehicles as "employers." Broward County's SST vehicles have no seat belts or safety straps because the County Safety Coordinator felt that such equipment would impede emergency exits from the vehicles. In San Bernardino and Orange County, Senate Bill 620 has discouraged the formation of coordination arrangements, as special paratransit providers try to increase their operating ratios to the required 10 percent minimum by shifting costs from operating to capital -- by purchasing unneeded vehicles.

OPERATIONAL PROBLEMS

Operational problems include such areas as vehicle and equipment design and performance, maintenance and downtime, labor relations and shortages, monitoring, reservation procedures and ride-limiting factors.

Vehicle Design

The physical features of many types of vehicles used for special paratransit services often prevent certain types of otherwise eligible persons from using the services, or undermine the performance of the vehicles, greatly increasing downtime. The roofs of Baton Rouge's vans are too low for easy entry by many passengers, and seating arrangements in the lift-equipped vans make it difficult to reach many of the seats. Tucson's system officials have cited numerous design defects in their mix of Dodge, Ford and Chevrolet vans, including weak suspension systems. And seat padding on the 15 passenger minibuses is so thick that the aisles are too narrow for easy movement to rear seats.

Equipment Design

The three most common problem areas cited are seating arrangements, lifts and tie-downs. Wheelchair positions, when in use, often leave too few remaining seats. Perimeter seating leads to motion sickness for many passengers. Seat belts which come with many vehicles are too short to go around wheelchair users. Some lifts have a 400 lb. weight limit. Because of design deficiencies and omissions, Des Moines' electric lifts had to be remodeled before they could be used safely. Safety bars had to be installed to keep wheelchairs from rolling off. Despite the reconditioning, power-related breakdowns are common. And tie-downs had to be re-designed to keep wheelchairs from shifting while the vehicle was in motion.

General Maintenance Problems and Downtime

While it is impossible to sort out problems by specific vehicle type and model, the same major problems appear to be basic to almost all vehicles:

- -- lifts;
- -- air conditioning;
- -- brakes and tires;
- -- electrical systems (particularly when electric lifts are included), and
- -- suspensions.

Certain other problems appear more frequently on only certain types of vehicles: chassis split apart on midibuses (e.g., Twin Coach or Transcoach models), while other problems relate more often to usage: brakes and tires wear out much faster on vehicles used for large group trips, presumably because of the large weights constantly shifting forward. All of Broward County's vehicles have experienced heavy corrosion damage from the salty ocean air.

Although most systems have preventive maintenance programs, few have adequate spares, and most are currently using vehicles far beyond their normal life spans. Many system officials feel that none of the vehicles commercially available are adequate for the intensive use made of them in special paratransit service, and problems generally begin to occur with increased frequency after about two years of service. A few officials interviewed felt that the quality of new vans is declining noticeably each year.

Air conditioning is a major problem. System officials in Broward County claim that van air conditioning has had more problems than minibus air conditioning, a fact which led to their gradual shift to the latter. Air conditioning is also poor in many six cylinder sedans.

Minibuses appear to have the most severe problems by far. Some system officials claim that no two of these vehicles are assembled the same way. It took one city six months to prepare their minibuses for service once they were delivered. The most common problems included electrical systems, brakes, air conditioning, chassis (several had water inside the structures), welds (fuel tanks and batteries fell out) and straps (fell off).

The 16(b)(2) process has exacerbated these problems. Portland's fleet contains 11 different vehicles. According to system officials, the difficulty of maintaining such a diverse fleet offsets the flexibility derived from it.

Weather, Climate and Topography

Weather and climate may have severe impacts on both operations and vehicle conditions. In cities which experience severe winters (Boston, Milwaukee, Lowell, Portland, Syracuse, Des Moines) many users are unable to reach the vehicles in curb-to-curb operations because of the risks associated with walking on ice and snow. Certain small portions of the service area are often inaccessible, particular hilly areas. Because snow and ice create potholes, considerable damage often occurs to tires, axles and front ends. Ice may jam lifts, and sub-zero temperatures may cause lubricants to freeze and moving parts to stick. Finally, steps, ramps and lifts may become glazed with ice, creating serious safety hazards for the passengers.

Communities experiencing prolonged , unusually hot summers (Baton Rouge, Broward County, Corpus Christi, Houston, Orange County, San Bernardino, Phoenix, Tucson) have an entirely different set of problems. Of greatest importance here is the strain placed on air conditioning units, particularly in operations with frequent stops and door openings and shuttings. Temperatures in non-air-conditioned vehicles in such climates--especially considering the physical attributes of the riders--are unbearable, and malfunctioning air conditioning units almost always mean that the vehicles must be pulled from service. In addition, super-hot pavements increase tire wear, particularly in vehicles handling large loads, where a large amount of weight shifts forward with each stop.

Southern coastal cities (Broward County) experience a third, entirely different set of problems related to their hot, moist air. Vehicles corrode rapidly, especially where mud accumulates on the undersides. Frequent washing and waxing, which might mitigate the effects of the climate, are uncommon in the underfunded world of special paratransit service, where, quite often, system officials can barely keep the vehicles out of service long enough to perform major repairs.

Level Change Limitations

The distinction between door-to-door and curb-to-curb service may appear subtle and of minor importance on the surface, but it is not so in winter climates. Many elderly but non-handicapped persons who may be able to walk one or two blocks to a line haul stop in fair weather are unable to do so when ice or snow are on the ground. Thus, the actual demand for special paratransit service may be significantly greater during winter months in cities which experience a lot of snow, or where substained sub-freezing temperatures (thus maintaining patches of ice) are common. However, the same weather-related barriers that limit one's use of line haul service often make it difficult to reach a paratransit vehicle from one's doorway without driver assistance.

Even among those elderly persons who physically might be able to reach the sidewalk unassisted, a majority often won't attempt such a walk for fear of slipping on the ice or snow. For such individuals, curb-to-curb operations offer service that is barely better than line haul service. Yet of all the communities examined in this Project that had severe winters (Boston, Des Moines, Lowell, Lincoln, Milwaukee, Portland, Syracuse), only Portland operates a door-to-door service. Lincoln mitigates this problem somewhat through a special accessibility program under which a handicapped individual may obtain public funding for the construction of a ramp from the porch to the sidewalk.

As both Lincoln and Portland illustrate, there are solutions to the level change problems associated with winter climates. Experience suggests, however, that such factors do not normally enter the decision-making process with regard to establishing level change limitations or eligibility criteria.

Driver-related Problems

Two broad classes of problems are related to drivers: shortages and turnover, and driver quality.

Shortages and Turnover. Compared to line haul wages in most cities, paratransit wages (except where drivers are unionized) are low, ranging typically from $3.00 to $5.00 per hour. Where wages are typically low (Baton Rouge, Orange County), driver shortages have occasionally resulted in lower deployment. Turnover is also a problem in many cities (Baton Rouge), and the constant replacement of drivers undermines both efficiency (e.g., higher training costs) and effectiveness (e.g., drivers don't remain in the service long enough to become thoroughly familiar with either the service area or the nuances of each passenger's particular handicap, or other ride-related difficulties).

Wages are not the sole determinant of driver shortages and turnover. Other factors -- shifts, seniority, opportunity for advancement in both position and salary -- affect them as well, in complex ways. One striking observation, however, is that in shared taxi operations, employers have no trouble recruiting special service drivers from their normal work force. The reason for this is that special paratransit wages, as low as they are, compare favorably with taxi wages in many cities. In addition, participation in paratransit service often exempts the drivers from many of the fees and other fixed costs associated with regular taxi service.

Driver Quality. The same realities that affect turnover (primarily low salaries) affect driver quality. Experienced and trained line haul drivers are often not interested in working as paratransit drivers.

Although this Project was unable to, and made no formal effort to, rank the quality of drivers from system to system, those operations which had the fewest driver-related problems appear to be those in which the drivers were able to choose paratransit from other services, usually on a seniority basis (i.e., in place of either line haul or general taxi service), and where they received the same or better (in the case of taxi drivers) wages for this work. Because of the seniority systems used to select drivers from among line haul staffs, the most experienced, senior drivers normally selected paratransit service -- a factor which may help to explain the high regard with which many drivers are held by the riders in union-run systems.

Data Collection and Record Keeping

This problem has taken many forms, depending upon the type of operation and the financing/monitoring requirements imposed on the operating agency. In Broward County, passengers usually are picked up by the same driver (and vehicle) each day, and often convey to their drivers information which ordinarily would be relayed to reservation clerks. Drivers often forget to enter cancelations on their logs, and the blank spaces appear as "no-shows."

User side subsidy operations present the most difficult problems. Not only is the separate passenger counting of user side subsidy clients often impossible, but taxi drivers rarely record hour or mileage data, making meaningful productivity analysis impossible. In addition, many taxi drivers turn in vouchers late, requiring the constant monthly updating of cost and passenger totals.

Procurement

Procurement has been a major problem in Boston, and a minor one in several other cities. As much special equipment for vans and minibuses is built by companies other than vehicle manufacturers, the latter often have to wait for the special equipment to arrive before delivering otherwise finished vehicles, increasing the overall turnaround time for delivery. Because special equipment is different for almost every order, vehicle manufacturers rarely have a backlog of such equipment.

Turnaround time for obtaining radio licences has also been a problem. San Bernardino had to wait for 10 months, Broward County for over a year. Without radios, these systems could not provide immediate-response service, or make insertions into their schedules.

Reservation Procedures

Reservation procedures are fraught with numerous problems, ranging from ignorance or misunderstanding of procedures and the inability to get through to operators to constraints on when calls may be made.

Lack of Knowledge about Procedures. This is a common problem largely because of the paucity of marketing activity associated with most paratransit systems. In Corpus Christi, eligible users have no way of learning about reservation procedures (when to call, degree of advanced notice, priorities, etc.), much less about the system altogether. Much time is wasted by reservation clerks in explaining procedures.

Limits on Placing Calls. Many systems start building the next day's schedules before the end of the present day. As a result, the users must make calls before a certain time in order to reserve a trip for the following day: Baton Rouge, 3 p.m.; Columbus, 1 p.m.; Des Moines, 2 p.m.; Houston, 3 p.m.; Lincoln, 3 p.m.; Lowell, noon (suggested), and Milwaukee (van services only), 3 p.m. In addition, some cities allow calls to be placed only during or before certain times for certain types of trips (Lincoln).

Confirmation Procedures. Because of their pre-scheduling approach, some systems are unable to confirm trips when the users call, and must either call them back later in the day (Columbus, San Bernardino) or at a later date (Boston, Syracuse)--even as late as the afternoon before the requested trip (Sacramento). This constraint is a severe ride-limiting factor for those making certain kinds of trips--particularly medical appointments which themselves must be pre-scheduled far in advance.

Lead Time to Ensure a Ride. Because demand is so great on certain systems, users must reserve trips far in advance to ensure themselves of a seat (Broward County, Milwaukee (vans), Phoenix Red Cross, Syracuse). Reservations made far in advance increase the number of cancellations and "no-shows," the latter as people forget their appointments. In Broward County, users who need escorts must reserve them--and as a result, trips--two weeks in advance.

Interference in Call-Making. Unlike line haul reservation operations, few paratransit switchboards have call-holding devices. Because both demand for service and convenient reservation times peak, switchboards may be greatly overloaded during some times of the day. Not only does this discourage many users (Orange County) from calling at all (they may not know that the switchboard has more capacity at other times of the day), but many others are frustrated in their attempts to cancel trips, and thus, many would-be cancellations translate into costly "no-shows" (Lincoln).

Lack of Pre-Scheduling Capacity. Many systems are unable to preschedule return trips, either because doctors and social service program officials don't adhere to their clients' appointment schedules (Portland) or because the nature of the service concept does not permit such pre-scheduling (Baton Rouge, Boston, Corpus Christi, Lincoln, Lowell, Milwaukee, Orange County Dial-A-Ride, San Bernardino Dial-A-Ride, Tulsa). Thus, even those users who have definite return times must call in at the conclusion of their appointments and wait for a vehicle to be dispatched.

Incomprehensible Reservation Structures. A few systems allow reservations for only certain types of trips to be made during certain hours, a practice which many users find confusing. Often, the confusion with the reservation process itself is compounded by complex rules about which trip types (i.e., medical, social, etc.) can be taken during certain times of day and by certain types of service (i.e., demand-responsive, immediate-response or subscription).

Duplicative Service

A number of factors -- law suit judgments (Tucson) and settlements (Orange County), franchise restrictions (Orange County), political decisions (Boston, Tulsa), jurisdictional constraints (Broward County) and union rules (Syracuse) -- have resulted in service concepts where either one service operates in a service area literally contiguous with another (Sacramento, Tucson), or where the service areas are broken up in such a way as to defy coordination (Phoenix).

Monitoring and Enforcement

Lack of monitoring and the inability to enforce eligibility policies have plagued many systems. Certain abuses are obviously more difficult to monitor (e.g., provider honesty) than others (e.g., driver abuse).

Lack of Monitoring. Many systems do not collect the data necessary to monitor system performance. Taxi systems which integrate special passengers with general riders (Milwaukee) often do not collect hour and mileage data. General record-keeping, necessary only for special users, is poor, and vouchers are turned in months late, requiring the constant updating of performance indicators (particularly those related to costs and passenger trips).

While contract providers are usually required to submit extensive data along with their periodic bills, operating agencies which also serve as lead agencies are often under no obligation to do so, and often have poor or no information about performance. In many cases where contractees provide data, lead agency officials have no way of ascertaining the accuracy of the figures and indicator values submitted. Spot checks with users and the lead agency's performance of the scheduling function lend some control to the monitoring process, but not enough to firmly establish data reliability. As few systems log in odometer readings and pick up and drop off times for all users (Broward County, Tucson), effectiveness indicators are practically impossible to determine; "educated" guesses normally are used as values (most accurate when made by drivers).

Enforcement and Eligibility Abuses. Special users sometimes obtain service by abusing eligibility and trip purpose priority restrictions:

-- Non-qualified persons "fake" handicaps, either by using unnecessary prothestic devices or by lying to drivers where self-identification/honor system rules govern;

-- Users certified on a temporary basis continue to use the service after they have recovered from the illness or injury for which they were certified;

-- Users lie about trip purposes, often taking a trip to an approved destination (e.g., medical facility and walking to a nearby unapproved destination (e.g., hairdresser), or one allowed only at different times of day;

-- Hardship provisions are abused, often involving the complicity of the contract provider or driver, and

-- Users lie about the circumstances which permit them to take immediate-response trips.

In shared-ride systems, such abuses are less common, as peer pressure from other passengers makes the abuser uncomfortable. Many times, system users are more vocal in their demands for enforcement than system officials.

SUPPLY AND DEMAND

Perhaps the greatest overall problem faced by special paratransit systems is the fact that demand for service greatly exceeds the availability of vehicles to meet it. There are several ramifications of this problem:

-- Unmet General Demand;

-- Unmet Articulated Demand;

-- Seasonal Shifts in Demand;

-- Uneven Utilization, and

-- General Ride-Limiting Factors.

Unmet General Demand

Although precise levels of demand are difficult to determine in most cities, it is fair to say (and most system officials admit) that only a fraction of actual demand for special service is being met. The two biggest reasons for this gap are the shortage of vehicles and the inefficiency of the overall community service concept -- particularly the lack of coordination among the often large number of service providers in the area. (Los Angeles County has over 900 separate special paratransit service providers; Boston has over 200.)

In most communities, the paratransit systems deal with the problem of controling demand by limiting supply. The primary means of doing so is to not market service. Other more subtle methods involve the imposition of ride-limiting factors which make it difficult for many of those technically eligible for service to actually use it. Few operators impose ride-limiting factors specifically for the purpose of limiting demand. Rather, such factors are used to prioritize the limited number of trips which can be served, doling them out to those whom community and system officials (or program sponsors) feel have the greatest need for them.

Unmet Articulated Demand

Unmet articulated demand represents those trips actually requested which were not accommodated, either because vehicles were not available or because ride-limiting factors prevented many types of trips from being served during certain times of the day, or altogether.

Because of the mechanics of special paratransit operations, the degree of unmet articulated demand is usually impossible to determine. While a few systems have clearly defined waiting lists (Corpus Christi), even those that do have no idea how many needed trips of various types are not taken because of ride-limiting factors. Users tend to "drop out of the system" once they have been rejected a couple of times, so most systems have no idea whatsoever about the degree of unmet demand of even their certified users. Rejection rates cited by system officials, therefore, are illusory. The one system which had a high rate for a short period of time (Lincoln) generated its rejections in an effort to tighten up eligibility requirements. Once the system "settled," the rejection rate dropped almost to zero.

Seasonal Shifts in Demand

A few communities -- particularly in Florida and the Southwest -- have a huge influx of temporary residents during the winter months. Many of these "sunbirds" are elderly (one third of whom, statistically, are handicapped), and ironically compound the need for special service because the places they choose to migrate to are usually already oversaturated with elderly persons. Broward County's year-round population is 30 percent elderly (over 60), and about one sixth of the population of the communities surrounding Phoenix are elderly.

Because many of these temporary residents own homes (and thus pay local and state taxes) in these communities, they are eligible for special paratransit service just as permanent residents are. To further compound demand, "sunbirds" (being wealthy enough to own two homes) rarely need service to social service programs, which are often provided on a more efficient subscription basis. Their social or recreational trip needs almost always require demand-responsive service.

Unfortunately, supply cannot ebb and flow with the seasons to accommodate such changes in demand. Thus, temporary and permanent residents alike experience a noticeable lack of service during these periods, and complaints rise. Particularly troubled are systems with few or no spares (Phoenix Red Cross), where the increased demand burdens the switchboards and adds to system disruption, as slack off-peak periods in which vehicles are normally repaired disappear.

Uneven Utilization

Paratransit service, like line haul service, is affected by uneven demand levels. Most systems experience peak demand during the conventional a.m. and p.m. peak periods, when the service is needed for work, school and medical trips. A few systems experience peaks during the mid-day, off-peak period. Regardless, few systems are able to vary deployment during weekday hours to accommodate such an uneven distribution of demand.

One partial solution to the problem is possible where the weekday operating hours are longer than a single workshift (i.e., eight or nine hours). In such cases, system officials may deploy vehicles in staggered shifts (Houston, Lincoln, Orange County, Tucson, Tulsa) or pull vehicles out of service during the off-peak according to demand (Syracuse). In rare cases (Houston), a few drivers may work split shifts, but in most cases of variable weekday deployment, staffing is accomplished because of either part-time work or long operating hours. The ability to vary deployment does not appear to be endemic only to large operations. Finally, the failure to market, because of peak hour overcrowding, often results in considerable deadhead and idle time.

General Ride-Limiting Factors

Many system features limit the ability of some users to ride the system, either during certain times of day, under certain circumstances or altogether:*

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*The examples cited are included because these particular ride-limiting factors were articulated by system officials, users or advocacy groups at the particular sites. Very likely, in many cases, these factors limit rides somewhat in every system.

-- Level Change Limitations (i.e., curb-to-curb rather than door-to-door service): Boston, Lowell, Syracuse;

-- Weather (often because service is not door-to-door, and users cannot reach the vehicles in inclement weather): Boston, Des Moines, Lincoln, Lowell, Milwaukee, Syracuse;

-- Lack of Vehicles Available to meet Articulated Demand: Boston, Broward County, Columbus, Houston, Lowell, Orange County, Portland, Sacramento, Syracuse, Tucson, Tulsa;

-- Equipment (e.g., tie-downs which do not accommodate electric wheelchairs): Boston, Des Moines, Houston, Lincoln, Tulsa;

-- Vehicles (including seating arrangements, location of tie-downs, lack of lifts, etc.): Baton Rouge, Boston, Houston, Lincoln, Tucson;

-- Lack of Marketing/Information Dissemination: Boston, Columbus, Des Moines, Houston, Sacramento;

-- Type of Service (i.e., subscription, pre-scheduled demand-responsive or immediate-response): Boston, Broward County, Houston, Lincoln, Lowell, Orange County, Portland, Sacramento, Syracuse, Tulsa;

-- Eligibility Criteria: Broward County, Des Moines, Houston, Lincoln, Milwaukee, Orange County, Portland, Tucson;

-- Trip Purpose Restrictions and Priorities: Broward County, Lincoln, San Bernardino, Syracuse;

-- Trip Reservation Procedures and Requirements: Broward County, Columbus, Orange County, Phoenix, San Bernardino, Tulsa, Lincoln;

-- Ride and Wait Times: Broward County, San Bernardino, Tulsa;

-- Fares: Broward County, Milwaukee, San Bernardino;

-- Street Conditions (i.e., rides are too bumpy for some persons): Boston, Lowell;

-- Location of Origins within the Service Area: Houston, Lincoln, Orange County, Portland, Syracuse, Tucson;

-- Constant System Change: Orange County;

-- Operating Hours: Phoenix, San Bernardino, Tulsa, and

-- Overcrowding: Tulsa.

It is important to note in the above context that while all ride-limiting factors are problems at least to those affected by them, they are not necessarily system deficiencies. More often, limitations help cope with the reality that the system cannot afford to carry all persons at all times of the day and night to all portions of the service area on short notice and for a "reasonable" price. The deficit environment in which special paratransit operates demands that some degree of efficiency be maintained in service delivery. Efficiency is usually a tradeoff with effectiveness, thus leading unavoidably to ride-limiting factors. The trick in making system choices is to be aware of the specific user groups who are likely to be affected by each choice, and to design a service package which does not discriminate disproportionately with respect to any user group.

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CHAPTER VII: ISSUES

INTRODUCTION

Because each community's issues are articulated from the viewpoint of those who raise them, a single community's experiences rarely portray a fair and well-balanced characterization of an issue. Yet, when the isolated and often different positions of several communities are viewed together, a much broader and more accurate picture emerges. This Chapter will examine 13 of the most common and significant issues involved in transportation for elderly and handicapped people in this multi-community context.

A key point to remember when examining these issues is that the field of paratransit is still relatively young. It would be unreasonable to expect the same communities' issues to have reached much greater maturity. The inconsistent positions which identical actors take on the same issues from city to city bear witness to this fact. Users in one city complain about trip priorities while in another city they complain because none have been established. Some communities are divided on the full accessibility issue while others are united against the concept. In one city, elderly groups complain because their youngest subgroup's eligibility (those 60 to 64) for certain trip types has been restricted. In another city, elderly persons receive no service whatsoever and don't appear to care.

With the examination of several communities' issues, it also becomes apparent that what is an issue in one place may not be in another. Quite often, policy decisions of major consequence go unnoticed while community spokespersons hotly debate the minutiae of minor and inevitable system deficiencies. In some cases, the mildness with which users react to obvious and severe ride-limiting factors is understandable: any service is a Godsend after a lifetime without it. Having experienced what a difference the existing service has made on their lives, few users are willing to even criticize such service for fear of losing it altogether.

Another curious chameleon-like quality of special service issues is their fade-in, fade-out resemblance to problems. Granted, the fact that there must be a problem in order to have an issue helps to explain some of this. But this relationship does little to clarify the distinction between the two. Most simply, a problem may become an issue when there is some disagreement surrounding it. Yet, it is hard to resist labeling the 504 regulations an issue even when a community is solidly united against them. Clearly, those circumstances that are both problems and issues have their own special qualities.

For purposes of simplification and manageability, those situations on which there is a difference of opinion have been classified as issues, those with universally-accepted negative connotations, problems.

Another difficulty in examining issues is that the positions of non-users are hard to assess, largely because true non-users are difficult to identify. Is someone who is technically eligible but not interested a non-user? What of someone with access to an alternative mode of transportation? What about someone who doesn't know about the service but who might use it if he or she did?

Another important observation is that many issues are simply the unavoidable consequences of demand exceeding supply. When choices are made which directly or indirectly exclude some potential users, a struggle sometimes ensues between the "haves" and the "have-nots." As any policy or service change is bound to affect someone, each change is a potential issue. As such, the same change may be a problem to some, an issue to others, and of no consequence whatsoever to still others.

In summary, issues are unavoidable, and satisfactory resolutions to many are not possible. Because of this, being aware of the major issues and the various forms they take is extremely important.

For purposes of discussion, the thirteen major special service issues common to most U.S. cities are classified into three broad groups:

-- Planning and Regulatory Issues;

-- Administrative and Operational Issues, and

-- Service Characteristics and Ride-Limiting Factors.

The chart following indicates which cities of those examined in this Project have experienced which of these 13 issues.

	Section 504/Full Accessibility	User Input Into Planning	Lack of Coordination	Funding Constraints	Selection of Operating Agency	Contractual Arrangements, Rates and Accountability	Organized Labor	Driver Training	Service Area and Concept	Eligibility and Trip Priorities	Operating Hours	Fares and Fare Structure	Level Change Limitations
BATON ROUGE								X		X			
BOSTON	X	X	X		X		X						X
BROWARD COUNTY		X	X		X					X			
COLUMBUS	X	X			X	X				X			
CORPUS CHRISTI				X								X	
DES MOINES		X			X					X		X	
HOUSTON		X						X	X	X			
LINCOLN										X			
LOWELL	X		X										
MILWAUKEE						X				X			
ORANGE COUNTY	X									X			
PHOENIX	X												
PORTLAND	X	X		X						X			
SACRAMENTO	X											X	
SAN BERNARDINO						X			X	X	X	X	
SYRACUSE	X												
TUCSON	X								X	X			
TULSA	X												

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PLANNING AND REGULATORY ISSUES

The major planning and regulatory issues common to U.S. cities include Section 504 and full accessibility, user input into the planning process, lack of coordination and funding constraints.

Section 504 and Full Accessibility

Full accessibility is the major transportation issue in most communities. Many communities have united squarely against the concept, viewing it as a counterproductive cost-drain that will deliver no service to handicapped people (Boston, Lowell, Portland, Tucson, Tulsa). Other communities are bitterly divided on the issue (Corpus Christi, Orange County, Phoenix, San Bernardino, Syracuse). No community on the whole appears even moderately supportive of the full accessibility concept, although community officials in Phoenix believe that a more flexible deployment scheme might be beneficial, given origin and destination patterns which render a paratransit feeder concept useful.

Just why some community members favor full accessibility is not clear, although there are some common patterns of expression. For one, many advocates for handicapped people consider it their responsibility to promote any and all improvements which will improve access for handicapped persons. Few users or advocates suggest that fully accessible buses be used in place of paratransit; rather, the majority want them both. In particular, handicapped persons who use paratransit are noticeably unzealous in their push for full accessibility, partly because they fear that its installation will come as a substitute for, rather than as a supplement to, paratransit service.

One observation lending support to this view is the fact that Milwaukee and Broward County--two communities which will be fully accessible by July, 1982--have the most extensive and fastest growing paratransit systems among all the communities examined in this study. One possible explanation for such a situation is that, in addition to recognizing the limitations of accessible line haul, these communities also don't have to anticipate major expenditures during the current decade which would absorb funds needed to develop a large-scale paratransit operation.

Few communities gave much thought to the concepts of interim service. For one thing, anything that exists is presently "interim" service as far as most of them are concerned. For another, the notion of "supplementary" service presupposes the existence of a useful system to supplement; few feel that lift-equipped line haul is such a system.

User Input into the Planning Process

This issue takes three basic forms:

- Users currently have little meaningful input into the planning process;
- Users had no input during the planning and design stages of the system's development, and now it is too late for their opinions and preferences to be accommodated, and
- The input of some user groups is greater than that of others.

Little Current Input. This issue has been rendered practically moot in recent months with the initiation of transition planning throughout the country. Yet, until January, 1980, when most communities seem to have begun their transition planning efforts, many communities provided no forum whatsoever for users (Des Moines, Portland). In other communities, users participated actively on advisory committees, but such committees had virtually no power, and their members no recourse (Columbus). Sometimes, particularly in large cities, this lack of power stemmed from the fact that paratransit planning lay outside the broader, formal transportation planning process (Boston). Other times, users and advocates were simply given no useful role in the planning or decision-making structure.

It does not appear that the degree of user input, in general, has had much effect, thus far, on the quality of a paratransit system. It is likely, however, that a correlation will emerge in the not-so-distant future, as the state-of-the-art develops, and as handicapped users and advocates improve their understanding of operations.

Limited Input into System Design. Because of complex interrelationships, making system choices in paratransit is difficult and risky. Largely because of their interrelationships, major system decisions are often hard to change. So users who were totally excluded from the planning and design process which created their systems find little solace in commenting on them. In a few communities, user groups are still quite bitter about it, particularly where ride-limiting factors affect a large number of potential users. In Boston, handicapped advocacy groups claim that 50 percent of the area's handicapped persons cannot use the service because it is curb-to-curb rather than door-to-door.

Disproportionate Input among User Groups. Unlike input in general, disproportionate input among various user groups has had significant and visible impacts on system development and service provision. Several cases in point illustrate how strongly the shape of the service package mirrors the participation of various user groups in the planning process. Broward County's SST program is highly elderly-oriented, reflecting the strong lobbying efforts of a large, cohesive elderly community on the County Commission. Corpus Christi's advisory committee contains no non-handicapped elderly persons at all; partly as a result, this group receives only two percent of all passenger trips. Similarly, Tucson has a strong, vocal handicapped coalition and virtually no elderly advocates; elderly persons are not eligible for service. And Des Moines' advisory committee is composed entirely of funding agency representatives and system and community officials; only agency-affiliated persons may use the system.

Lack of Coordination

The lack of coordination in paratransit is one of its major problems, but strangely, one that rarely has become an issue -- although it has begun to attract attention in a few large cities with a large number of uncoordinated operations.

Two communities which have pressed hard for coordination, and which have acheived limited success,are Broward County and Lowell. Their experiences illustrate an important point about coordination: the lack of coordination may be central to the issue, but institutional barriers and mechanisms have received much more attention.

Broward County. Broward County has effected a considerable number of coordination arrangements, primarily because of Florida DOT's approach to the administration of the 16(b)(2) Program. Essentially, 16(b)(2) applicants sign third party agreements, which either call for the recipients to loan their vehicles to the County-operated SST service when not in use, or to "loan" them to SST altogether in exchange for SST's agreement to serve the recipient-agency's clients.

Lowell. Of its three deployed vehicles, Lowell's Roadrunner must siphon off one to provide service to downtown Boston, while the remaining two operate on a strictly intracity basis. Yet Lowell is surrounded by small communities with similar services, all unrelated to one another. The Administrator of the Lowell RTA has tried to convince surrounding communities to join the RTA umbrella and to coordinate or consolidate operations. Community officials in towns surrounding Lowell have acknowledged the economies of scale and cost savings which might accrue from such coordination, but feel that the principle of autonomy is more important.

Funding Constraints

Despite the theoretically far-reaching impacts of funding programs on service delivery, funding constraints have become neither a problem nor an issue in many communities because system officials have simply ignored them. Because productivity had improved greatly as a consequence, it is doubtful that funding program officials would be upset, except in the most pedantic ways. Such systems cast suspicion on the claims of communities which insist that the administration of funding programs at the Federal level impedes coordination.

Corpus Christi. Four of the system's seven deployed vehicles deliver food to handicapped "shut-ins" during the midday off-peak, and another vehicle is sometimes used to deliver food and supplies to nutrition sites. A few community members have begun to question whether or not these vehicles, funded as they are, can legitimately be used to transport food--or for that matter, anything other than people.

Portland. Portland's service area is characterized by a small, populated inner zone (22 square miles), to which the RTP delivers the bulk of its service, and an 838 square mile outer zone. With the evolution of the Section 18 Program, system officials fear that their service will be trapped between the constraints of both the Section 18 and Section 3 and 5 Programs: Section 18 will not apply to urbanized areas, Sections 3 and 5 not to rural areas.

ADMINISTRATIVE AND OPERATIONAL ISSUES

Four major administrative and operational issues appear to be important and common:

- -- Selection of Operating Agency;
- -- Contractual Arrangements, Rates and Accountability;
- -- Organized Labor, and
- -- Driver Training.

Except for driver training, grappling with these issues has involved a different set of actors than the planning and regulatory issues previously discussed. For the mostpart, these issues involve lead agencies, local governments, and service providers and unions.

Selection of Operating Agency

Where a lead agency was unable to provide service itself, or did not want to, a substitute operating agency had to be chosen. In many communities, operations were sorted out among several providers, either under a brokerage-type arrangement (Houston), or by permitting all qualified providers to participate, operating on a competitive basis (Milwaukee). In other communities, a sole provider was selected, either by competitive bid (Boston, Columbus, Lowell, Sacramento), local/regional mandate (Des Moines) or because of franchise rights (Tucson). It is in this latter case that issues have emerged.

Providers who were not selected have voiced objections to the selection process or its results, or other members or agencies in the community have questioned the wisdom of a governmental decision. In one case a taxi operator challenged the wisdom of the community in making a governmental social service agency both lead and operating agency. In all cases, the cause of the issue was simple: someone not involved wanted to be.

Contractual Arrangements, Rates and Accountability

Another vivid tell-tale illustration of paratransit's youth is the difficulty involved in devising a financing scheme which encourages performance improvement without penalizing the lead agency for it. Even Orange County, which has such a scheme on paper, hasn't yet devised a way to monitor it.

Organized Labor

Union involvement has become an issue usually after a non-union operation has begun running for a year or two, and where such an operation has become a permanent community fixture. A few communities have successfully solved this problem, as they see it, by deliberately shaping their systems to avoid the slightest contact with union labor, either by contracting out all operating functions, or by avoiding the use of any transit-related funds (e.g., Section 5).

The desire to escape union involvement has not always been motivated by the same fears. Broward County, Boston and Milwaukee were concerned with costs, and Portland (which operates door-to-door service) with work rules. Yet Tulsa's union-operated system experiences by far the lowest cost per passenger trip of any of the systems examined in this Project (with the exception of the Phoenix Red Cross system, which uses volunteer drivers). And Tulsa's union drivers have no aversion whatsoever to literally picking handicapped schoolchildren out of their wheelchairs and carrying them in their arms onto non-lift-equipped transit buses.

It may be possible to learn more about this issue from the experiences of cities in which organized labor was not an issue. Portland's transit union seems unconcerned with the non-union paratransit service. San Bernardino's transit agency serves as lead agency for six contract operations run by three private providers, and actually performs the scheduling for two of the operations. Here again, the union is unconcerned.

Driver Training

Driver training has been a minor issue in two of the communities examined, where certain advocacy groups felt that training was inadequate. In Baton Rouge, a social service agency for handicapped persons felt that better training was necessary, and that aides should accompany all severely handicapped passengers. And advocates for mentalyy retarded persons in Houston felt that special training should be provided for the handling of this client group.

Much of this issue stems from the almost inseparable relationship between eligibility, driver training and insurance, particularly with respect mentally retarded persons. Some communities have avoided the issue altogether (and have created another one in the area of eligibility as a result) by simply excluding mentally retarded persons from the service (Milwaukee, Orange County). But far more common are cases where they are included, while drivers are given no special training in handling their problems (here, system officials may pay for this choice in higher insurance rates).

Balancing these three elements--eligibility, training and insurance--is a difficult task, and an issue in one of these three areas is hard to avoid. Of the communities examined in this Project, half are currently experiencing major issues in one of them.

SERVICE CHARACTERISTICS AND RIDE-LIMITING FACTORS

Five important system characteristics commonly become issues where they operate as ride-limiting factors:

-- Service Area and Concept (i.e., spatial/temporal coverage);

-- Eligibility and Trip Prioritization;

-- Operating Hours;

-- Fares and Fare Structure, and

-- Level Change Limitations.

Service Area and Concept

Service areas are often defined by franchises (Tucson), by census blocks (Phoenix), by city limits (Tulsa, Lowell), by transit districts (San Bernardino) or by other criteria. Rarely are they established strictly with respect to demand. Because demand exceeds supply in most communities, service concepts are often established to screen out demand rather than to accommodate it.

Eligibility

Many systems have constrained the demand for service by limiting potential users, or indirectly, by restricting the types of trips which may be taken at certain times. Those who are left out as a consequence often view their exclusion as arbitrary, and have voiced strong objections.

Experiences in some cities where elderly eligibility has not been a problem suggest that issues do not arise where elderly persons are excluded altogether (Milwaukee, Orange County, San Bernardino, Tucson) or where the cutoff point is related to line haul usability (Sacramento, where only the "frail" elderly--those over 75 years of age--are automatically included). Nor has agency-affiliation (Des Moines, Portland) or income (Phoenix) become a major issue when standards have been applied uniformly to the entire elderly population.

Variable Service for Different User Groups. System designers may effect differences in service to various user groups in very subtle ways, often unintentionally. Elderly persons, quite simply, have different trip needs than handicapped persons and needs for service at different times of day. And subscription service accommodates certain of these needs better than demand-responsive service, and vice versa. Thus, trip purpose priorities and emphasis on types of service (i.e., subscription versus demand-responsive) can greatly affect the numbers of each user group participating in the service.

Trip Prioritization. Many communities have placed a higher priority on medical, work and/or school trips (Columbus, Houston, Milwaukee, Tucson), upsetting those whose needs are different. Some communities have refined these priorities further: Milwaukee's hardship provision (which reimburses qualified users for burdensome fares) applies only to medical trips, for-credit school trips, and for-compensation work trips. Many of those engaged in volunteer work or non-matriculating education have had to drop out. In contrast, the widespread practice of providing immediate-response trips only for medical emergencies (Broward County, Corpus Christi, Houston, San Bernardino, Tulsa) or for medical purposes in general, is willingly accepted.

In some areas, there are problems because there are no trip priorities (Portland) or where they are not strongly enforced (Lowell). Some communities have experienced dissent about priorities in some areas and the lack of them in others (Milwaukee). Yet even when priorities have affected all user groups somewhat equally, those persons suddenly excluded because of policy changes have made this an issue (Lincoln).

Viewing these seemingly contradictory incidents together, one is able to discern a pattern, underscored by several unwritten principles which are rarely contradicted:

(1) Preferential treatment for medical purposes, in terms of immediate-response service, is generally acceptable;

(2) Exclusion of broad user groups altogether is acceptable;

(3) Prioritization by trip purpose is generally disliked where a distinction exists among medical, school, work, social/recreational, shopping and nutrition/social service program trips. Yet the lack of priorities is seen as a problem with respect to trips to country clubs, taverns or hairdressers;

(4) Differential fares by income group are generally acceptable, whereas exclusion of service to the same income groups is not, and

(5) Once a group has service, changes in the program which remove or reduce it are likely to cause dissension.

Where these principles are violated, or where rapid, dramatic changes occur in the advocacy power structure of a community which provides top-heavy service to one user group, issues can be expected to erupt.

Operating Hours

Operating hours, if limited at all, will exclude certain users from taking certain types of trips. In general, users understand this as a fact of paratransit life.

Operating hours, however, become an issue when certain user groups are able to take noticeably fewer trips than other user groups. This situation is most common with respect to communities which offer no evening service, since handicapped persons -- especially those who work or go to school -- have social and recreational needs which can only be met during the evenings. In contrast, the social/recreational needs for most elderly persons can be accommodated in the afternoon.

Fares and Fare Structure

Fare increases understandably raise objections, particularly in cases where users previously had been riding for free. below the poverty level, system and community officials have striven to depress fares as much as possible; operating ratios of .03 or less are not uncommon in systems which charge fares (Columbus, Orange County). Public outcries have been loudest where proposed fare increases have been sudden and steep (Sacramento, San Bernardino)--a particularly serious problem in California, where the State Legislature has set a minimum standard for paratransit operating ratios (to qualify for State financial assistance, the operating ratio must be at least .10).

Fares have been more of an issue where the fare structure differentiates between user groups--except in the case of lower fares to low income riders. At times, even seemingly equitable fare policies have raised objections. Des Moines' attempt to devise an equitable fare structure has been met with resistance. The key here, however, may be the fact that all of Des Moines' elderly and handicapped riders formerly paid nothing.

Level Change Limitations

Whether service should be curb-to-curb or door-to-door has been an afterthought in the design of most systems. Yet no other single policy decision has haunted system officials as relentlessly.

One reason that this issue has been so explosive and so common is that the curb-to-curb/door-to-door decision seems, in most cities, to have been made backwards with respect to user needs. Of the seven cities examined in this Project which experience severe winters -- when ice and snow prevent many users from reaching the vehicles from their doors unassisted -- only Portland and Des Moines provide door-to-door service. One finds more door-to-door service in warm cities where the majority of residents live in one-story, ground-level dwellings (Baton Rouge, Broward County, Phoenix, Sacramento, Tucson).

There are, of course, a great many factors to take into account when making the basic level change decision. And too, there are hybrid approaches ("modified"curb-to-curb, as in Lincoln).

VIII: UNUSUAL FEATURES

While no two systems in any two cities are similar enough to even compare performance indicators, there are also few features of any system which could truly be called unique. A number of factors help to explain this fact:

- -- The paratransit state-of-the-art is relatively new in the U.S., dating back only to 1971 (Haddonfield). Very few systems have had time to even master the "basics" of efficient and effective operation;
- -- Most paratransit systems began and evolved haphazardly, without consultation with other systems and cities;
- -- There are no formal channels for exchanging information about paratransit among U.S. cities, and
- -- Paratransit systems are so reflective of and dependent upon the unique features of their service areas and communities that many system operators and planners do not believe in much cross-applicability of ideas from one system to the next.

Because of the economic and political realities associated with paratransit operation at the local level, system decision-makers have had little opportunity to innovate. This helps to explain the fact that of the 25 unusual features found in the 18 cities examined in this study, only five appeared in more than one city.

For the purpose of clarity, the unusual features discovered in the systems and communities examined in this project are organized into the following six classes:

- -- service concepts;
- -- coordination;
- -- labor and staffing;
- -- user policy and procedures;
- -- contractual/financing/monitoring arrangements, and
- -- maintenance/vehicles/equipment/fuel.

Service Concepts

Inner and Outer Zones. Several communities' service areas consist of small dense inner areas surrounded by large, sparsely populated outer rings. Most major trip generators lie in the inner areas. Some of these communities have chosen to provide different levels of service to these two different areas as a means of maximizing vehicle utilization and efficiency in general:

-- Portland, Maine deploys nine of its 11 vehicles within a 22 square mile inner area, allocating the others among eight sectors of a large, 838 square mile ring, each of which receives service one or two half days per week. Eight of the service's 11 drivers live in outlying portions of these eight sectors (one driver in each), and all eight of their vehicles--parked at their homes overnight--begin their day's work by carrying passengers from these sectors into the downtown area, where all but two remain until the process is reversed in the p.m. peak;

-- Lincoln deploys six of its seven vehicles in a 52 square mile inner zone, while one vehicle serves each of five subsections of a large 791 square mile outer ring one day per week. Outer ring service is provided only to and from destinations within the inner zone, and

-- Syracuse initially deploys all five of its vehicles within a 35 square mile inner zone, allocating a vehicle to the remaining 750 square mile outer area as needed.

Taxis as Supplementary Service. Several communities supplement their basic paratransit operations with shared-ride taxi service. Phoenix Dial-A-Ride dispatches taxis during normal operating hours for trips too isolated for the regular 17 vehicle service to handle without greatly disrupting service. Tulsa and Portland, Maine dispatch taxis to serve trips outside of the paratransit system's operating hours -- in Tulsa's case, only when the return trip lies outside those hours. Broward County and Corpus Christi use taxis as a supplement only in special cases, Broward County for work, school and medical trips for handicapped persons, and Corpus Christi for return trips from medical centers. And Des Moines employs taxis both to assist the main Paratransit service in handling outlying pickups during normal operating hours, and for evening and weekend trips.

Decentralization of the Operating Division. Both Portland and Lowell (occasionally) allow drivers to take their vehicles home at night, thus eliminating the need for them to deadhead to work and then deadhead out again to the service area portions to which they are assigned. Portland essentially has located one driver in each of the eight outlying subsections of its service area. Lowell's drivers occasionally take the vehicles home when their first a.m. pickup is closer to home than to the operating division.

Other more subtle and limited forms of decentralization exist as well. In Phoenix's Red Cross system, volunteer drivers, working one day per week, transfer vehicles to the next day's drivers by storing them either at home or at conveniently located garages. Drivers are often called at home and given their day's schedule.

Integrated Special and General Dial-A-Ride. In Southern California, demand-responsive transportation has been used for several years as a substitute for or supplement to fixed route transit service. In both San Bernardino and Orange County, elderly persons ride along with general riders throughout the day, while handicapped persons are provided with their own separate systems. In Orange County, elderly persons have exclusive use of this service during off-peak hours (9 a.m. to 3 p.m.).

Special Escort Assistance. Many handicapped persons, particularly those in wheelchairs (and more specifically, those in electric wheelchairs), need assistance even to board lift-equipped paratransit vehicles, or to reach the vehicles from their homes. Where the service is curb-to-curb, or where the person is too heavy to handle, another helper is needed to assist the passenger. Portland, Maine's RTP, which is door-to-door, deadheads a second vehicle to the pickup point in such cases, and the second driver serves as an assistant. In San Bernardino, where most operations are curb-to-curb, the dispatcher notifies the Retired Senior Volunteer Program, and they dispatch a special attendant (volunteer).

Coordination

Vendorization. A few communities have formal arrangements between providers and local program sponsors whereby the latter pays the former on a per-trip basis for service to its specific clients. Most clients are then integrated with other riders in the service:

-- In Houston, the transit agency serves as lead agency over four providers, one of which functions as a service coordinator. Several sponsoring agencies pay a small portion of trip costs by purchasing booklets of prepaid tickets from the lead agency and then distributing them to their clients, who use them as fares;

-- In Sacramento, the lead and operating agency, Careful Coach (a subdivision of the public transit agency) functions as lead agency over a second operating agency which is paid on a per hour basis. Several sponsoring agencies pay the lead agency on a per-hour basis for service to its clients, as well as for their participation in a consolidated maintenance program run by the operating agency. Most of the clients paid for by the participating sponsoring agencies are not integrated with other agencies' clients, and travel primarily on a subscription basis, in large, grouped trips. The per-hour rate ($16.00/hour) approximates actual operating costs, and

-- Des Moines' MTA serves as the operating agency for the Polk County Department of Social Services. All passengers are affiliated with social service agencies which reimburse MTA directly, on a per-trip basis, for the service.

A-95 Review as a Coordinating Mechanism. Baton Rouge's Capital Regional Planning Commission, the region's MPO, uses the A-95 review process as a means of soliciting letters from service providers outlining their intentions to interface service with the community's major E&H paratransit service operated by the East Baton Rouge Council on Aging.

16(b)(2) Process as a Coordinating Mechanism. Both Broward County and San Bernardino use the 16(b)(2) process as a means of effecting coordination arrangements among their 16(b)(2) recipient/service providers:

-- In Broward County, the county division of the State Department of Transportation contacts 16(b)(2) applicants and suggests that they sign an "agreement of understanding" with the major 51 vehicle county-operated paratransit service.

-- In San Bernardino, the San Bernardino Association of Governments advises the State Department of Transportation on certain aspects of a 16(b)(2) applicant's status. In its rating of candidates, Caltrans awards up to 25 of the 100 possible qualifying points on the basis of their actual or intended coordination efforts.

Trip Sharing Program. Phoenix's Community Council runs a trip-sharing program involving 27 social service agency providers who "buy" and "sell" trips from one another in order to improve system efficiency. The trip-sharing program effectively barters trips between agencies through an independent coordinator, who quotes per-trip prices for the most qualified and available providers. The sponsor then chooses the provider. The coordinator bills the "buyer"-sponsor, who then pays the "seller"-provider directly.

Consolidation. As a reaction to the fragmentation of special paratransit services throughout the State, Maine's Department of Human Services divided the State into seven special districts, and required each of those districts to choose a single recipient who would then receive all funds for special paratransit service designated for the communities within that district. This act effectively forced the consolidation of all independent paratransit service providers in each district, eliminating considerable duplication of service and staff.

Integrated Community Accessibility Program. Lincoln, Nebraska's paratransit service evolved as part of a larger, major comprehensive accessibility program, which included thousands of curb cuts and the construction of hundreds of ramps for individual homes, enabling residents to accommodate the level changes necessary to reach paratransit vehicles.

Integration of Passenger and Food Service. Two paratransit systems use part of their fleets to deliver food or supplies to shut-ins or nutrition sites:

- The Phoenix Red Cross uses one of its 17 vehicles solely for the purpose of carrying plates, silverware, etc. to nutrition sites, and
- Corpus Christi's special paratransit system deploys four of its nine vehicles, during the off-peak (10:00 a.m. to 2:00 p.m.) to deliver food from nutrition sites to shut-ins. Corpus Christi officials have encountered numerous problems with this service, particularly with respect to cleaning the vehicles before resuming passenger service. This service may soon be discontinued, possibly replaced by a single vehicle retrofitted with a steam table.

Labor and Staffing

Part-Time, Non-Union Labor within a Union, Transit Agency. The Des Moines MTA, which functions as an operating agency under the Polk County Department of Social Services, uses part-time, non-union drivers on its Paratransit service. To enact such an arrangement, the General Manager offered to give any retired line haul driver the right of "first refusal" in the hiring of Paratransit drivers. Drivers would work part-time, at $4.00/hour (the union rate was $7.00/hour), and would, thus, remain eligible to receive their pensions and social security payments in full. Several drivers began this service, but all quit after a week, primarily because they did not like the type of work. Under the agreement, MTA is allowed to hire regular part-time workers in their absense.

Drivers as Subcontractors. Paratransit drivers in Columbus' Project Mainstream work as subcontractors to the operating agency, whereby they are paid $14.50 per hour, but must lease their vehicles from the operating agency at $8.75 per hour plus 5¢ per mile. The effective operating wage is $5.48. Because of the arrangement, the operating agency is not required to, and does not, pay any fringe benefits.

Integration of Handicapped Persons into Lead and Operating Staffs. The management structures of both Boston's lead and operating agencies contain several handicapped persons, including the Directors of both operations. This situation stemmed from the historical development of the service, whereby both Directors were instrumental in lobbying for, planning and designing the service. As such, both are extremely well qualified in a substantive, operations sense, as well as able to articulate user needs from their own experiences. The staffs have achieved a high degree of credibility and trust among system users and decision-makers as a result of the participation of these persons.

User Policy and Procedures

Hardship Provision. In Milwaukee's User Side Subsidy program, users had been charged for portions of the fare that exceeded $7.00, creating an often prohibitive economic hardship for those who needed regular service (i.e., to work or school) to destinations far from their homes. Under a special hardship provision, users are now reimbursed for all but $10. of these excess charges every two weeks if the trips involved are for work, school or medical purposes.

Library Referral for the Deaf. In Tulsa, deaf persons contact the public library through a special telephone-typewriter installed in their homes. The library attendant arranges for the trip, and teletypes the needed information (e.g., pick-up time) to the potential triptaker once the trip has been confirmed.

Trial Trip Escort. In Tulsa, a staff assistant at the public library accompanies handicapped or elderly persons on their first trip on line haul or paratransit.

One-Time-Only Pre-Eligibility Trips. Qualified visitors (i.e., those who would normally qualify if they were residents) in Tulsa, may use the special paratransit service one time, for an emergency without being certified, as may general residents.

Direct-to-Home Notification Procedure. In Corpus Christi, users wishing to cancel trips are requested to telephone their drivers at home in the early morning, thus saving an intermediate communication between the reservation clerk and the driver.

Contractual/Financing/Monitoring Arrangements

Wheelchair Handling Surcharge. Both Milwaukee and Phoenix encourage taxi drivers to service wheelchair-bound persons by paying the drivers a surcharge ($3.00 in Milwaukee, $4.00 in Phoenix). As a result, a few drivers in Milwaukee use station wagons, and actually seek out these users. Those drivers physically unable to handle those clients (i.e., drivers with bad backs) are identified as such at the operations headquarters, and dispatchers do not assign them to wheelchair pickups.

Balancing Efficiency and Effectiveness. Orange County Transit District's contracts with operating agencies include a Trip Performance Standard (TPS) requirement in order to encourage them to maximize loading under the per-hour contractual arrangement while not abusing the incentives by overextending ride times. Essentially, the operating agency may keep the fares it collects as long as it meets the TPS, which requires that a certain portion of ride and wait times lie within certain ranges (e.g., 80% of ride times must be no longer than 30 minutes).*

Lunar Calendar. Orange County's operating agencies are billed, and their performance monitored, on uniform four-week periods, 13 per year. This arrangement enables system monitors to examine performance from period to period, since each period contains essentially the same number of days of each type (except for holidays). In addition, drivers are paid on a bi-weekly basis, and thus, the arrangement is consistent not only with these pay periods, but the operating agencies' record-keeping and cash flow as well.

Maintenance/Vehicles/Equipment/Fuel

Consolidated Maintenance Program. Working under a demonstration grant from the State, Paratransit, Inc., one of Sacramento's two operating agencies, runs a consolidated maintenance program its garage. Several other social service agencies' vehicles are maintained in this shop, undergoing both routine and preventive maintenance. The agencies reimburse Paratransit, Inc. for their inclusion in the program, although these payments cover only partial costs.

On-the-Road Repairs. When Baton Rouge's STS vehicles break down en route, maintenance officials dispatch a special emergency repair vehicle to the break-down site, and attempt to perform the repairs on the spot. Only if the repair truck is unable to fix the vehicle on the road is it towed to the garage.

Compressed Natural Gas as Sedan Fuel. Yellow Cab of North Orange County runs its sedans on alternating compressed natural gas (CNG) and gasoline. The Chevrolet 350 cc. engines have their carburetors converted (approximate cost: $1,000) so that the Checker/Chevrolet sedans can run on either fuel. Four large tanks are mounted deep in the trunk of the vehicles, and the CNG is transferred each evening from a large group of storage tanks filled from a city-owned tap on the company grounds. When the vehicle uses up its CNG, the driver flips a switch, and the sedan continues on its way using gasoline. As a result, the vehicle does not have to deadhead or otherwise stop to refuel during the day. System officials claim that the CNG emits half the pollutants of regular gasoline, costs half as much as gasoline, and doubles engine life.

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*OCTD is allowed to sell as many pre-paid tickets as it can, the revenue from which it retains. Thus, system operators do not collect fares from all passengers.

APPENDIX A: GLOSSARY

The collection of terms found below contain commonly used terms which describe paratransit planning and operations.

Regulations and Legislation. Following are key pieces of legislation and regulations, and responses to them, which have affected the planning for and provision of special paratransit service to elderly and handicapped individuals:

--Rehabilitation Act of 1973, Section 504--This congressional mandate, spearheaded by the then Department of Health, Education and Welfare, required that no otherwise eligible person should be denied access to public transportation because of a physical or other handicap.

--504 Regulations--The UMTA regulations of June, 1979 required that recipients make 50 percent of all line haul vehicles lift- or ramp-equipped by July, 1982 -- unless such a requirement would place an undue burden on the resources of those communities (in such cases, the time for compliance is as July, 1989). These regulations were designed to implement Section 504 of the Rehabilitation Act of 1973. They also required the commencement of regularly-scheduled community-wide planning efforts aimed at preparing a Transition Plan (due July, 1980) which would describe how the community would meet its commitment to handicapped persons during its period of "interim" accessibility;

--Transbus Mandate--The mandate (superceded) which stated that Federal transportation funds would be provided to local communities only for the purchase of a certain type of transit vehicle meeting rigid Federal specifications, the most prominent features of which were a power-operated lift or ramp, a lower front step, and the ability of the vehicle to "kneel" so that the bottom step would be only 18 inches from the curb;

--"Special Efforts"--The "Special Efforts" requirements are a subsection of UMTA's April 30, 1976 regulations which require local communities to make "special efforts" to accommodate the transportation needs of those persons unable to use conventional line haul service,

--Joint Planning Regulations-- These regulations, promulgated in September, 1975, established Metropolitan Planning Organizations (MPOs) and gave them the central responsibility for transportation planning in urbanized areas (those areas including more than 50,000 persons);

--16(b)(2) Program--A section (added in 1973) of the Urban Mass Transportation Act of 1964, as amended, which provides Federal funds for the acquisition of vehicles to be used in transportation service by private, non-profit agencies. Most programs are administered by state departments of transportation or highway departments, which must coordinate (in theory) the acquisitions so as to minimize duplication of service;

--Section 15 FARE Reporting Requirements--A section of the UMT Act of 1964, Section 15 requires all transit agencies or other agencies using Federal transportation funds to provide uniform and extensive performance data. There are three levels of reporting, the most stringent pertaining to the largest agencies;

--APTA Lawsuit--Shortly after the 504 regulations were promulgated, 12 cities filed a suit, along with their transit agencies (under the umbrella of the American Public Transit Association) to enjoin U.S. DOT and UMTA from enforcing the mandate, and

--Cleveland and Zorinski Amendments--In June, 1980, Congressman Cleveland and Senator Zorinski introduced amendments in the House and Senate, respectively, which would allow communities to waive the full accessibility provisions if they could meet the transportation needs of their handicapped citizens through other means (i.e., through paratransit service), and if the members of those communities would agree to such a waiver.

User Types. The following terms are commonly employed to differentiate between various types of special paratransit users.

--Low Income Riders--Those persons, who may or may not be elderly or handicapped, but who are eligible for service through their inclusion in special Federal programs for low income persons (e.g., "Meals on Wheels") or because they reside in specially-designated areas (e.g., in Community Development Block Grant census tracts);

--Transportation Handicapped Persons--Those persons unable to use conventional line haul transportation all, most or some of the time because of physical or mental limitations;

--Elderly--Those persons over a certain age (depending on the standard used). The Federal definition is 65 years of age, but many communities consider elderly persons to be as young as 55, or as old as 75 (in this latter case, referred to as the "frail" Elderly);

--Non-handicapped Elderly--Those persons who are elderly but not physically or mentally transportation handicapped, and who, as a result, are able to use conventional line haul transportation;

--Non-elderly Handicapped--Those handicapped persons who are not elderly according to the standard used, and

--Developmentally Disabled--Unable to use line haul service because of body movement limitations. Thus, this category does not include the Blind, Deaf or Mentally Retarded.

Conceptual Terms. These terms describe concepts of service and utilization:

--Service Area--The area which is served during at least part of the total operating hours. Often service areas are divided into zones, modules (which often are coincident with city boundaries) or inner and outer areas (in such cases, service is usually concentrated in the inner areas);

--Service Concept--The way in which the service area is divided up with respect to time and space--i.e., when service is provided to which portions of the service area;

--Deployment--The way in which vehicles are assigned to cover various portions of the service area;

--Articulated Demand--Demand measured by those who actually request service;

--Actual Demand--Overall demand for service, which consists of the 7.5% of the population which are non-handicapped Elderly, the 2.5% which are both elderly and handicapped, and the 2.5% which are non-elderly handicapped--minus those who have access to other means of transportation, including private automobile, taxis, conventional line haul vehicles and private ambulance service, and

--Latent Demand--That portion of actual demand which is not known, but which would or could assert itself as supply becomes increasingly available.

Planning and Administrative Terms. These terms describe the organizations and functions surrounding the direct provision of service:

- --Lead Agency--The lead agency is the organization ultimately responsible for the provision of service, although not necessarily the provider of that service. When the lead agency is separate from the operating agency, it administers all financing arrangements, monitors operations and engages in all planning, advocacy and user-related activities to ensure that community objectives are being met to the degree possible;

- --Operating Agency--That agency or organization charged with the actual operation of the vehicles and the transportation of system users;

- --Funding--The process of obtaining money for operations, including all funding sources from government grants to farebox revenue;

- --Financing--The transfer of funds from one agency to another, either from the lead agency to a provider to cover operating costs, or from an agency whose clients are served by the provider;

- --Trip Purpose Priorities--The policy of affording a higher priority to trips for certain purposes than others, either during certain times of the day (e.g., higher priority for work trips during peak hours) or at all times (e.g., higher priority for medical purposes). Higher priority service may be delivered by a higher saturation of vehicles, by requiring less reservation lead time, or by many other means;

- --Fare Policy--The policy which determines which user types should pay for service;

- --Monitoring--The process whereby system officials and other community members oversee the operation of the system;

- --Evaluation--The formal study of a system's features, performance and/or service;

- --Certification--The process under which a qualified user is identified as such (e.g., by providing documentation for a handicap, proof of age), and given the means of continually identifying him- or herself as such in order to use the system;

--Client Referral--The process by which organizations seek out and notify persons qualified to use the system, and

--Coordination--The methods by which decisions are made jointly among various institutions, organizations and groups in the community, or the way in which service is divided up among various providers.

Operational Terms. These terms relate to the operation of the vehicles themselves and to the process of picking up and dropping off riders:

--Type of Service--Division of services provided by lead time for advanced registrations (i.e., subscription, pre-scheduled demand-responsive or immediate-response service);

--Subscription Service--Service which is provided on a regularly-scheduled basis, often on the same day and at the same time each week, and often daily or several times each week. Users generally do not have to make reservations for each trip, and they are generally picked up and dropped off in the same sequence each trip;

--Pre-Scheduled Demand-Responsive Service--Service which is not regularly-occurring, and for which schedules differ constantly. Users must reserve each trip separately in each case, and in advance;

--Immediate-Response Service--Service provided immediately upon request, often within one half hour of the request;

--Trip Types--The classification of trips by the purposes for which they are made. In most cases, trip types may be classified as: medical, work, school, nutrition, social service program-related, social/recreational, shopping and other;

--Level Changes Accommodated--The number of level changes across which a driver will assist a passenger in his or her trip from the pick-up point to the vehicle;

--Door-to-Door Service--Service in which all level changes from the user's door onto the vehicle (and the reverse on return trips) are accommodated;

--Curb-to-Curb Service--Service in which a user is helped only onto and off of the vehicle (thus, he or she must reach the curb on his or her own), and

--Modified Curb-to-Curb Service--Service in which a limited number of level changes are accommodated beyond assistance onto or off of the vehicle, but not necessarily enough to help a user from his or her door onto the vehicle.

Vehicles and Equipment. These are the most commonly-used types of vehicles and equipment found in special paratransit service:

--Sedans--The term is used here to include any standard passenger car or station wagon which carries anywhere from four to nine persons. The most commonly used sedan is the Checker, which carries seven passengers when two fold-down jump seats are used;

--Vans--Small, gasoline-powered vehicles normally holding between four and 15 passengers, rarely larger than 22 feet long, and generally available as standard commercial vehicles;

--Minibuses--Diesel-powered vehicles normally between 22 and 28 feet in length, and which normally hold 19 to 25 passengers (fewer when wheelchair positions are used);

--Midibuses--Diesel-powered vehicles, normally between 30 and 35 feet in length, built in most cases on recreational vehicle chasses, and which may carry as many as 35 persons not counting standees;

--Line Haul Buses--Standard 45 passenger, 40 foot buses;

--Lifts--Devices which raise wheelchair users and other severely handicapped persons from the street onto the vehicle, often along with the driver, and

--Tie-downs--Devices which hold wheelchairs in place on the vehicles.

Performance Terms. These terms describe the amount and quality of service delivered:

--Efficiency--The amount of service provided by a given amount of effort or resources;

--Effectiveness--The nature or quality of service delivered;

- --Financial Performance--The relationship between costs and revenues which stems from the particular type and mix of service provided, and
- --Operating Ratio--The percentage of operating costs covered by farebox revenue.

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